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ABSTRACT

This basic guide to a complete secondary mathematics curriculum is designed to ensure that each student will be presented uniform mathematical concepts and principles, geared to his individual needs, abilities, and interests. The guide is not planned for use with a particular textbook; instead, it is to serve as a core around which each teacher can develop his program of instruction using a wide range of supplementary materials. Two program sequences are presented, one for college-preparatory students and one for vocational students. Mathematical procedures and concepts have been developed and arranged in a learning sequence. As a student completes one phase of the program, he can move immediately to the sequence that follows. The college-preparatory sequence is a continuum with interwoven new mathematical concepts presented by rigorous methods of deductive reasoning. The vocational-preparatory continuum is developed around problems that relate to occupations and careers and provides a review of the basic fundamentals of mathematics. Behavioral objectives are stated and resource books are listed for topics. (JP)

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CURRICULUM GUIDE

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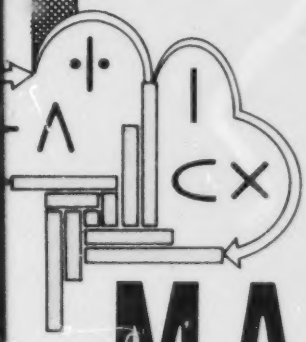

MATHEMATICS

NION PARISH ::: HIGH SCHOOLS

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CURRICULUM GUIDE FOR MATHEMATICS

IN

UNION PARISH HIGH SCHOOLS

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Curriculum Guide for Mathematics

Developed for

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FOREWORD

The increasing contribution of mathematics to the culture of the modern world, as well as its importance as a vital part of scientific and humanistic education, has made it essential that the mathematics in our schools be both well selected and well taught. School systems commonly lack a comprehensive and reasonably consistent set of mathematical objectives. To this end, the Union Parish School System has attempted to develop a continuous program in secondary mathematics.

The program is designed as a basic guide to ensure that each student will be presented uniform mathematical concepts and principles, geared to his individual needs, abilities, and interests. Since no single source of information is adequate in teaching, the guide is not planned for the use of any particular textbook. Instead it is to serve as a core around which each teacher can develop his program of instruction, using a wide range of supplementary materials.

It is hoped that the program will lead the student to a better understanding of mathematics, thus enabling him to make a greater contribution to society.

OBJECTIVES

1. To introduce individualized instruction in mathematics into the Union Parish high schools through the use of this curriculum guide.

2. To improve teachers' effectiveness in teaching mathematics.

3. To improve students' attitude toward mathematics.

4. To give students the opportunity to advance individually without being time locked into a traditional program.

5. To measure student's achievement on an individualized basis.

6. To improve pupil mastery of content material in mathematics.

7. To develop skill in logical thinking.

8. To help the student relate mathematical problems and skills to real life situations.

9. To develop a systematic program of mathematical instruction in Union Parish to help insure an improvement in academic quality.

IMPLEMENTATION OF THE PROGRAM

Individualized Instruction

This is an approach in which the student receives instruction as an individual. Whether he is a part of a large group, a small group, or working alone, he is under the supervision of a teacher. Working at his ability level enables each student to achieve a degree of success.

Placement

A student's initial placement in the program is determined by teacher recommendations and the student's achievement, ability, and vocational interests.

Continuous Learning

As a student completes one phase of the program, he will move immediately to the sequence that follows.

Behavioral Objectives

These are statements that deal with specific measurable goals. They are stated in precise language and define the desired behavior which can be observed when the student has completed the skill involved.

Continuum of Skills

This is a detailed curriculum guide, written in sequential form, for a particular subject area.

Structure of the Program

Mathematical procedures and concepts have been developed and arranged

in a learning sequence, each designated by a Roman numeral. It is suggested that each student complete at least 70% of the skills in each sequence before proceeding to the next.

Level A and Level B

The content material is divided into two parts, Level A and Level B, each representing approximately one half of the objectives to be attained in a given subject area.

Checklist

Because each student progresses at his own rate, it is important that an accurate record be kept. The teacher is to keep up to date the checklist which accompanies each learning sequence by checking each objective as it is attained. These checklists are to be kept by the teacher until the student completes the course, and the final checklist is to be placed in the student's permanent record folder.

Evaluation

Evaluation of the student is made by the teacher on the basis of observable behavior, performance tests, attitude, and attendance.

Enrichment

If a student completes all the learning sequences for a particular subject, he may choose from the topics listed for enrichment. These choices will vary according to his interests and abilities.

College-Preparatory

The continuum contains five courses designated as college-preparatory.

These are recommended primarily for students who plan to attend college. However, other students with special interests or abilities in mathematics may elect these courses

Vocational-Preparatory

The continuum contains three courses designated as vocational-preparatory. These are planned primarily for the non-college-bound student. However, these courses are designed so as to be beneficial to any student in his personal or business life.

Resources for Teachers

It is hoped that the guide will lead the teacher to use the many textbooks, programmed materials, and such visual aids as filmstrips, transparencies, tapes, charts, and models that are available. A list of resource books, used in developing this curriculum guide, is included and will be useful in implementing the program.

RESOURCE BOOKS

COLLEGE PREPARATORY CURRICULUM

Modern Algebra, Book I	Houghton Mifflin
Modern Elementary Algebra	Holt
Modern Algebra and Trigonometry, Book II	Houghton Mifflin
Algebra, Book II	Ginn
Modern Geometry	Houghton Mifflin
A Course in Geometry, Plane and Solid	Ginn
A Modern Course in Trigonometry	Holt
Modern Trigonometry	Houghton Mifflin
Modern Trigonometry	Ginn
Principles of Mathematics	McGraw-Hill

VOCATIONAL PREPARATORY CURRICULUM

Applied Business Arithmetic	Southwestern
Mathematics in Daily Use	Heath
Business Mathematics	McGraw-Hill
Economic Mathematics	Allyn and Bacon
Essential Business Mathematics	McGraw-Hill
General Mathematics, I	Laidlaw
General Mathematics	Holt
Modern Basic Mathematics, Book I	Singer
Refresher Arithmetic	Allyn and Bacon
General Mathematics, II	Laidlaw
Second Course in Fundamentals of Mathematics	Allyn and Bacon

INTRODUCTION TO

COLLEGE-PREPARATORY MATHEMATICS

This section of the continuum has been written primarily for college-bound students who need a comprehensive understanding of the concepts and principles of mathematics.

The ever-increasing complexity of our civilization, especially in the realm of science and technology, makes it imperative that the content of the mathematics curriculum be kept updated and the pace of the students' training be increased. For this reason the continuum has interwoven the new mathematical concepts with the rigorous methods of deductive reasoning.

It is of vital importance that the precollege student master the material in preparation for advanced work in his field. However, the mathematics presented in this guide is valuable for all well-educated citizens in our society.

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

LEVEL A AND LEVEL B

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level A

I. Variables and Open Sentences

A. Defines the terms needed in this unit such as

1. Domain
2. Constant
3. Algebraic expression
4. Term
5. Coefficient
6. Algebraic sentence
7. Left member of equation
8. Right member of equation
9. Root
10. Exponent
11. Base
12. Power

B. Recognizes and uses necessary symbols and abbreviations

C. Simplifies algebraic expressions using rules of order

D. Evaluates algebraic expressions

1. Without exponents
2. With exponents

E. Writes expressions using exponents and symbols of inclusion

F. Solves open sentences by

1. Substitution
2. Inspection

G. Describes solution sets by

1. Graphing
2. Tabulation

H. Converts verbal expressions to algebraic expressions

I. Solves verbal sentences using the following steps:

1. Reads problem and chooses variable

2. Forms open sentence from the given facts in the problem

3. Finds the solution set

4. Checks the answer with the words of the problem

J. Devises alternative methods for solving verbal problems

CHECKLIST

ALGEBRA I CONTINUUM

Level A

PUPIL _____ TEACHER _____

I. Variables and Open Sentences

____ A. Defines terms used in this unit

____ B. Recognizes and uses symbols and abbreviations

____ C. Simplifies algebraic expressions using rules of order

____ D. Evaluates algebraic expressions

____ E. Writes expressions using exponents and symbols of inclusion

____ F. Solves open sentences

____ G. Describes solution sets

____ H. Converts verbal expressions to algebraic expressions

____ I. Solves verbal sentences

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level A

II. Axioms, Equations, and Problem Solving

A. Identifies

1. Axiom
2. Assumption
3. Postulate
4. Proof
5. Similar (like) terms
6. Unlike terms
7. Equivalent equations
8. Identities

B. Names and uses axioms of equality

1. Reflexive
2. Symmetric
3. Transitive

C. Recognizes and applies properties of the number system

1. Closure
2. Commutative
3. Associative
4. Distributive
5. Multiplicative identity
6. Additive identity
7. Multiplicative inverse
8. Additive inverse

D. Knows and applies

1. Substitution property
2. Multiplicative property of zero

E. Uses properties of the number system to

1. Evaluate numerical expressions
2. Explain and construct proofs
3. Simplify algebraic expressions

F. Transforms equati[illegible]using

1. Addition property of equality
2. Subtraction property of equality
3. Division property of equality
4. Multiplicative property of equality

G. Forms equivalent equations by combining terms and using transformation properties and solves them

H. Translates verbal problems to algebraic statements and solves

CHECKLIST

ALGEBRA I CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

II. Axioms, Equations, and Problem Solving

____ A. Identifies needed terms

____ B. Names and uses axioms of equality

____ C. Recognizes and applies properties of the number system

D. Knows and applies

____ 1. Substitution property

____ 2. Multiplicative property of zero

E. Uses properties of the number system to

____ 1. Evaluate numerical expressions

____ 2. Explain and construct proofs

____ 3. Simplify algebraic expressions

F. Transforms equations using equality properties of

____ 1. Addition

____ 2. Subtraction

____ 3. Division

____ 4. Multiplication

____ G. Solves equations using transformation properties

____ H. Solves verbal problems

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level A

III. Operating with Directed Numbers

A. Defines

1. Signs of direction
2. Directed numbers
3. Magnitude
4. Absolute value

B. Expresses phrases as directed numbers

C. Compares directed numbers using

1. Symbols of equality and inequality
2. Points on the number line

D. Has a working knowledge of

1. Addition on the number line
2. Opposite of a directed number
3. Opposite of the sum of two numbers
4. Absolute value (magnitude)

E. Adds directed numbers using rules for addition

F. Subtracts directed numbers applying definition and rules for subtraction

G. Demonstrates an understanding of the multiplicative property of -1

H. Multiplies directed numbers using rules for multiplication

I. Has a working knowledge of

1. Reciprocal

2. Reciprocal of a product

3. Definition of division

J. Divides directed numbers using rules of division

K. Improves skills in operating with directed numbers by devising and using shortcuts

L. Combines terms and evaluates expressions using extended properties

M. Changes verbal sentences to algebraic sentences and solves

CHECKLIST

ALGEBRA I CONTINUUM

Level A

PUPIL _____ TEACHER _____

III. Operating with Directed Numbers

____ A. Defines terms needed in this unit

____ B. Expresses phrases as directed numbers

____ C. Compares directed numbers

D. Has a working knowledge of

____ 1. Addition on the number line

____ 2. Opposite of a directed number

____ 3. Opposite of the sum of two numbers

____ 4. Absolute value (magnitude)

____ E. Adds directed numbers

____ F. Subtracts directed numbers

____ G. Multiplies directed numbers

____ H. Uses concept of reciprocals

____ I. Divides directed numbers

____ J. Combines terms and evaluates expressions

____ K. Solves verbal sentences

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level A

IV. Equations, Inequalities, and Problem Solving

A. Defines

1. Order, direction, or sense of an inequality

2. Equivalent inequality

3. Complementary angles

4. Supplementary angles

5. Integer

a. Even

b. Odd

c. Consecutive

B. Has a working knowledge of

1. Order property of numbers

2. Properties of inequalities

a. Transitive

b. Additive

c. Multiplicative

3. The fact that the sum of the angles of a triangle equals 180°

C. Solves equations

1. For a designated variable

2. Containing symbols of inclusion and negative multipliers

D. Solves inequalities and graphs solution sets using appropriate properties

E. Categorizes verbal problems into groups and solves

1. Number relations
2. Consecutive integers
3. Angle relations
4. Uniform motion
5. Mixture

CHECKLIST

ALGEBRA I CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

IV. Equations, Inequalities, and Problem Solving

____ A. Defines terms associated with this unit

B. Knows and applies

____ 1. Order property of numbers

____ 2. Inequality properties

____ 3. Triangle-sum property

____ C. Solves equations for designated variable

____ D. Solves inequalities

____ E. Graphs solution sets of inequalities

____ F. Solves verbal problems

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level A

V. Working with Polynomials

A. Defines and recognizes the family of polynomials

1. Monomial (term)

2. Binomial

3. Trinomial

B. Indicates the degree of a polynomial

C. Arranges terms of a polynomial in order of increasing or decreasing degree in a variable

D. Adds polynomials

E. Subtracts polynomials

F. Solves and checks more advanced equations containing polynomials

G. Recognizes and uses rules of exponents for

1. Multiplication

2. Power of a product

3. Power of a power

H. Simplifies expressions containing exponents

I. Uses distributive property to multiply

1. Polynomial by monomial

2. Polynomial by polynomial

J. Simplifies expressions and solves problems using polynomial-polynomial products

K. Expands a polynomial expression

L. Solves and checks verbal problems using products and powers of polynomials

M. Defines concept of zero used as an exponent

N. Uses property of quotients and division rules of exponents to divide

1. Monomial by monomial

2. Polynomial by monomial

3. Polynomial by polynomial

CHECKLIST

ALGEBRA I CONTINUUM

Level A

PUPIL _____ TEACHER _____

V. Working with Polynomials

____ A. Defines and recognizes the family of polynomials

____ B. Indicates the degree of a polynomial

____ C. Arranges terms of a polynomial in order

____ D. Adds polynomials

____ E. Subtracts polynomials

____ F. Solves and checks equations containing polynomials

____ G. Uses rules of exponents in multiplication

____ H. Simplifies expressions containing exponents

____ I. Uses distributive property to multiply polynomials

____ J. Simplifies expressions and solves problems using polynomial-polynomial products

____ K. Expands a polynomial expression

____ L. Solves verbal problems using products and powers of polynomials

____ M. Defines the concept of zero used as an exponent

____ N. Divides polynomials

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level B

VI. Special Products and Factoring

A. Defines

1. Factor
2. Prime number
3. Greatest common factor
4. Linear term
5. Quadratic term
6. Standard form
7. Multiple root

B. Factors monomials

1. Over the set of primes
2. Into positive integral factors
3. To find greatest common factor

C. Computes special products such as

1. Squaring a monomial
2. Multiplying the sum and difference of the same two numbers
3. Squaring a binomial
4. Multiplying any two binomials using the sight method (FOIL)

D. Identifies and factors polynomials

1. With a common monomial factor
2. With a common polynomial factor (optional)
3. Which are the difference of two squares
4. Which are trinomial squares
5. Which are general trinomials

E. Distinguishes between the several types of factoring

F. Combines several types of factoring to produce complete factorization

G. Solves polynomial equations by using these steps

1. Transforming into standard form

2. Factoring the polynomial

3. Setting each factor equal to zero

H. Builds equations from given solution sets

I. Uses factoring in verbal problem solving

CHECKLIST

ALGEBRA I CONTINUUM

Level B

PUPIL _____ TEACHER _____

VI. Special Products and Factoring

___ A. Defines terms related to this unit

___ B. Factors monomials

C. Computes special products such as

___ 1. Squaring a monomial

___ 2. Multiplying the sum and difference of the same two numbers

___ 3. Squaring a binomial

___ 4. Multiplying two binomials at sight (FOIL)

D. Identifies and factors polynomials

___ 1. With a common monomial factor

___ 2. Which are the difference of two squares

___ 3. Which are trinomial squares

___ 4. Which are general trinomials

___ E. Factors polynomial expressions completely

___ F. Solves polynomial equations by factoring

___ G. Builds equations from given solution sets

___ H. Uses factoring in verbal problem solving

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level B

VII. Working with Fractions

A. Defines

1. Algebraic fraction
2. Complex fraction
3. Fractional equation
4. Lowest common denominator
5. Mixed expression
6. Ratio
7. Percentage
8. Base
9. Per cent (rate)

B. Writes expressions as fractions

C. Notes any values of the variable for which the fraction is not defined

D. Reduces fractions to lowest terms

E. Has a working knowledge of ratio

1. Recognizes the four equivalent forms of ratio
2. Writes ratios using like units
3. Finds ratio of two variables under given conditions
4. Uses ratio in solving verbal problems

F. Solves percentage problems using the formula

G. Knows and applies rule for multiplication of fractions

H. Multiplies fractions, factoring when necessary, and gives product in lowest terms

I. Divides fractions using factoring when necessary

J. Combines operations of multiplication and division in simplifying fractions

K. Adds and subtracts fractions

1. With equal denominators

2. With unequal denominators

L. Interchanges fractions with mixed expressions

M. Simplifies complex fractions by either of the two methods (optional)

N. Solves open sentences

1. With fractional coefficients

2. Which are fractional equations

3. Which are formed from verbal problems such as

a. Investment

b. Per cent mixture

c. Work

d. Motion

CHECKLIST

ALGEBRA I CONTINUUM

Level B

PUPIL _____ TEACHER _____

VII. Working with Fractions

____ A. Defines terms pertaining to this unit

____ B. Writes expressions as fractions, noting restrictions on the variable

____ C. Reduces fractions to lowest terms

____ D. Demonstrates an understanding of ratio

____ E. Solves percentage problems using the formula

____ F. Multiplies fractions using factoring when necessary

____ G. Divides fractions using factoring when necessary

____ H. Combines multiplication and division in simplifying fractions

____ I. Adds and subtracts fractions

____ J. Interchanges fractions with mixed expressions

____ K. Solves open sentences containing fractions

____ L. Solves verbal sentences containing fractions

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level B

VIII. Graphs

A. Defines

1. Ordered pair of numbers
2. Abscissa (first coordinate)
3. Ordinate (second coordinate)
4. Coordinates of a point
5. Horizontal axis
6. Vertical axis
7. Origin
8. Parallel lines
9. Plane coordinate system
10. Quadrant
11. Slope
12. Y-intercept
13. Graph
14. Half-plane
15. Boundary line

B. Solves equations involving ordered pairs

C. Names and plots points in a coordinate plane

D. Recognizes that the graphs of linear equations in two variables form straight lines

E. Graphs linear equations in two variables

1. By using tables
2. By slope-intercept method
3. By point-slope method
4. By using two points

F. Determines slopes of linear graphs

G. Notes that parallel lines have equal slopes

H. Forms equation of a line when given

1. A point and the slope

2. Two points

I. Forms the equation of a line parallel to a given line through a given point

J. Graphs linear inequalities in two variables

K. Recognizes forms of equations that produce

1. Horizontal graphs

2. Vertical graphs

3. Graphs containing the origin

CHECKLIST

ALGEBRA I CONTINUUM

Level B

PUPIL _____ TEACHER _____

VIII. Graphs

____ A. Defines terms contained in this unit

____ B. Solves equations involving ordered pairs

____ C. Names and plots points in a coordinate plane

____ D. Graphs linear equations in two variables

____ E. Determines slopes of linear graphs

____ F. Forms equation of a line under given conditions

____ G. Graphs linear inequalities in two variables

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level B

IX. Linear Sentences in Two Variables

A. Defines

1. Systems of simultaneous equations

2. Inconsistent equations

3. Independent equations

4. Dependent equations

5. Point of intersection

6. Coincide

B. Determines by inspection whether a system of equations is dependent, independent, or inconsistent

C. Solves systems of equations

1. Graphing

2. Addition-subtraction

3. Substitution

D. Uses two variables to solve verbal problems such as

1. Number relations

2. Digit

3. Motion

4. Age

5. Numerator-denominator relations

CHECKLIST

ALGEBRA I CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

IX. Linear Sentences in Two Variables

____ A. Identifies terms

____ B. Determines by inspection whether a system is dependent, independent, or inconsistent

C. Solves systems of equations by

____ 1. Graphing

____ 2. Addition-subtraction method

____ 3. Substitution

____ D. Uses two variables to solve verbal problems

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA I CONTINUUM

Level B

X. The Real Numbers

A. Defines

1. Real number system
2. Rational number
3. Terminating decimal
4. Repeating decimal
5. Irrational number
6. Radical
7. Like radicals
8. Index number
9. Radicand
10. Principal root
11. Radical equation
12. Hypotenuse
13. Conjugate

B. Recognizes and uses the density property and the order property of rational numbers

C. Performs operations with rational numbers such as

1. Interchanging fractions with decimals
2. Locating numbers between given numbers
3. Rounding off to a designated degree of accuracy

D. Determines square roots by

1. Inspection
2. Product property of square roots
3. Quotient property of square roots

E. Distinguishes between rational and irrational numbers

F. Demonstrates an understanding of the property of completeness for real numbers

G. Extracts square roots using

   1. Approximation method

   2. Tables

   3. Traditional method

H. Has a working knowledge of the Pythagorean theorem

I. Identifies the simplest form of a radical expression

J. Performs operations with radicals such as

   1. Multiplication

   2. Division

   3. Rationalizing the denominator (conjugate)

   4. Simplification

K. Adds and subtracts radicals

L. Multiplies binomials containing radicals

M. Solves and checks radical equations

N. Solves verbal problems containing radicals

O. Learns by rote the quadratic formula

P. Uses quadratic formula in solving equations

CHECKLIST

ALGEBRA I CONTINUUM

Level B

PUPIL _____ TEACHER _____

X. The Real Numbers

____ A. Defines necessary terms

B. Performs operations with rational numbers such as

____ 1. Interchanging fractions with decimals

____ 2. Locating numbers between given numbers

____ 3. Rounding off

____ C. Expresses radicals in simplest form

____ D. Extracts square roots

____ E. Has a working knowledge of the Pythagorean theorem

____ F. Multiplies and divides radicals

____ G. Adds and subtracts radicals

____ H. Multiplies binomials containing radicals

____ I. Solves radical equations

____ J. Solves verbal problems containing radicals

____ K. States and uses the quadratic formula

ENRICHMENT FOR ALGEBRA I

I. Quadratic Relations (See pages 46, 49 in the guide)

   A. Graphs parabolas

   B. Solves quadratics by

      1. Graphing

      2. Completing the square

      3. Formula

   C. Determines nature of roots by use of discriminant

II. Variation (pages 43, 49)

   A. Distinguishes between direct, inverse, and combined (joint) variation

   B. Works problems involving the various types of variation

III. Factor Theorem and Remainder Theorem (page 39)

IV. Modular Arithmetic

V. Relations and Functions (page 43)

VI. Complex Numbers (page 56)

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

LEVEL A AND LEVEL B

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level A

I. Sets of Numbers; Axioms

A. Defines

1. Real numbers
2. Unique
3. Hypothesis
4. Conclusion
5. Theorem

B. Reviews sets, set vocabulary, and set operations

C. Applies previous knowledge of the properties of real numbers to

1. Graph on number line
2. Add and subtract real numbers
3. Multiply and divide real numbers
4. Find solution sets
5. Supply reasons in a given proof
6. Develop original proofs
7. Evaluate numerical expressions

CHECKLIST

ALGEBRA II CONTINUUM

Level A

PUPIL _____ TEACHER _____

I. Sets of Numbers; Axioms

___ A. Defines terms in unit

___ B. Demonstrates knowledge of sets, set vocabulary, and set operations

C. Uses properties of real numbers to

___ 1. Graph on number line

___ 2. Add and subtract real numbers

___ 3. Multiply and divide real numbers

___ 4. Find solution sets

___ 5. Supply reasons in a given proof

___ 6. Develop original proofs

___ 7. Evaluate numerical expressions

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level A

II. Open Sentences in One Variable

A. Defines

1. Converse
2. Straight angle
3. Identity

B. Reviews fundamental algebraic operations such as

1. Degree of polynomial
2. Combining like terms
3. Simplifying polynomial expressions
4. Evaluating expressions and sentences
5. Solving equations and inequalities

C. Works with combinations of open sentences using

1. Absolute value
2. Union and intersection
3. Graphing on real number line
4. Venn diagrams
5. Roster

D. Knows and applies zero product-factor theorem

E. Increases proficiency in solving verbal problems

CHECKLIST

ALGEBRA II CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

II. Open Sentences in One Variable

____ A. Defines terms associated with this unit

B. Has a working knowledge of fundamental algebraic operations such as

____ 1. Degree of polynomial

____ 2. Combining like terms

____ 3. Simplifying polynomial expressions

____ 4. Evaluating expressions and sentences

____ 5. Solving equations and inequalities

C. Works with combinations of open sentences using

____ 1. Absolute value

____ 2. Union and intersection

____ 3. Graphing on real number line

____ 4. Venn diagrams

____ 5. Roster

____ D. Knows and applies zero product-factor theorem

____ E. Solves verbal problems

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level A

III. Systems of Linear Open Sentences

A. Defines

1. Equal ordered pairs
2. Cartesian coordinate system
3. Y-intercept
4. X-intercept
5. Linear combination

B. Names coordinates which satisfy a given algebraic condition

C. States coordinates of x- and y-intercepts of a linear equation by inspection

D. Determines the slope of a line

1. By inspection
2. When given two points of the line
3. When given the equation of the line

E. Graphs equations

1. Using x- and y-intercepts
2. Using any two points
3. Using a point and the slope of the line
4. Using tables
5. Involving absolute value

F. Writes equation of a line

1. Using point-slope form

2. Using slope-intercept form

3. Using two-point formula

4. Through a given point and parallel to a given line

G. States whether equations are dependent, inconsistent, or independent

H. Solves systems of linear equations by

1. Graphing

2. Linear combination (addition-subtraction)

3. Substitution

I. Solves and checks verbal problems using two variables

J. Graphs linear inequalities and systems of inequalities

CHECKLIST

ALGEBRA II CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

III. Systems of Linear Open Sentences

____ A. Defines needed terms

B. States coordinates

____ 1. Which satisfy a given algebraic condition

____ 2. Of x- and y-intercepts

____ C. Determines the slope of a line

____ D. Graphs equations

____ E. Writes equation of a line

____ F. States whether a system of equations is dependent, independent, or inconsistent

____ G. Solves systems of linear equations

____ H. Solves verbal problems using two variables

____ I. Graphs linear inequalities and systems of inequalities

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level A

IV. Polynomials and Factoring

A. Defines

1. Factor set
2. Greatest common factor
3. Least common multiple
4. Irreducible polynomial (prime)
5. Integral multiple

B. Uses rules of exponents to perform indicated operations

C. Reviews rules for multiplication and multiplies polynomials

D. Factors polynomials

1. Over the set of primes
2. To find the greatest common factor and least common multiple
3. By previously learned methods
4. Which are sums or differences of two cubes
5. Which contain a common polynomial factor
6. By using the factor theorem

E. Uses factoring to solve equations and inequalities

F. Uses factoring to solve verbal problems

G. Divides polynomials

1. By traditional method
2. By synthetic division

CHECKLIST

ALGEBRA II CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

IV. Polynomials and Factoring

____ A. Defines terms used in this unit

____ B. Uses rules of exponents to perform indicated operations

____ C. Multiplies polynomials

____ D. Factors polynomials completely

____ E. Uses factoring to solve equations and inequalities

____ F. Solves verbal problems by factoring

____ G. Divides polynomials

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level A

V. Rational Numbers and Expressions

A. Defines

1. Complex fraction

2. Scientific notation (standard)

3. Significant digits

B. Simplifies expressions containing exponents by using

1. Previously learned rules

2. Rules for negative and zero exponents

C. Writes rational algebraic expressions noting restrictions

D. Simplifies rational expressions

E. Multiplies and divides rational expressions

F. Adds and subtracts rational expressions

G. Simplifies complex fractions

H. Solves equations and inequalities such as

1. Rational equations and inequalities

2. Fractional equations

3. Systems of equations and inequalities containing fractions

4. Those in verbal form

I. Equates common fractions with rational decimal fractions

J. Uses rules to state the number of significant digits

K. Interchanges scientific notation with decimal form or ordinary notation

L. Rounds off to a given number of significant digits

CHECKLIST

ALGEBRA II CONTINUUM

Level A

PUPIL _____ TEACHER _____

V. Rational Numbers and Expressions

___ A. Defines terms pertaining to this unit

___ B. Simplifies expressions containing exponents

___ C. Writes rational algebraic expressions noting restrictions

___ D. Simplifies rational expressions

___ E. Multiplies and divides rational expressions

___ F. Adds and subtracts rational expressions

___ G. Simplifies complex fractions

___ H. Solves equations and inequalities containing fractions

___ I. Equates common fractions with rational decimal fractions

___ J. States the number of significant digits

___ K. Interchanges scientific notation with decimal form or ordinary notation

___ L. Rounds off to a given number of significant digits

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level A

VI. Relations and Functions

A. Defines

1. Relation
2. Domain
3. Range
4. Function
5. f(x)
6. Constant function
7. Polynomial function
8. Linear function
9. Direct variation
10. Proportion
11. Extremes
12. Means
13. Quadratic function
14. Vertex

B. Specifies domain and range of a relation and makes the graph

C. Selects functions from given relations

D. Evaluates functions when given a replacement for x in f(x)

E. Writes proportions and solves problems involving direct variation

F. Graphs special functions and relations (optional)

G. Demonstrates knowledge of symmetry with respect to a line

H. Graphs quadratic functions of the form

1. $y = ax^2 + bx + c$
2. $y = a(x-h)^2 + k$

I. Determines from a quadratic function

1. The equation of the axis of symmetry
2. The coordinates of the vertex

3. Whether the vertex is a maximum or a minimum point

4. The maximum or minimum value of the function

J. Converts quadratic functions of the form $y = ax^2 + bx + c$ into the form $y = a(x-h)^2 + k$ by completing the square

K. Graphs quadratic inequalities

CHECKLIST

ALGEBRA II CONTINUUM

Level A

PUPIL _____ TEACHER _____

VI. Relations and Functions

____ A. Defines terms used in this unit

____ B. Specifies domain and range of a relation and makes the graph

____ C. Selects functions from given relations

____ D. Evaluates functions when given a replacement for x in f(x)

____ E. Writes proportions and solves problems involving direct variation

____ F. Demonstrates knowledge of symmetry with respect to a line

____ G. Graphs quadratic functions

____ H. Has a working knowledge of symmetry and maximum and minimum points in quadratic functions

____ I. Converts quadratic functions from one standard form to another

____ J. Graphs quadratic inequalities

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level B

VII. Irrational Numbers and Quadratic Equations

A. Defines

1. n^{th} root
2. Cube root
3. Leading coefficient
4. Sum property of roots
5. Product property of roots
6. Discriminant
7. Zero of a function
8. Decimal representation of a rational number
9. Irrational number

B. Determines the number and nature of real n^{th} roots of a given number

C. Solves equations by extracting real roots

D. States restrictions on the values of the variables so that radicals denote real numbers

E. Knows and uses the theorem for determining rational roots

F. Recognizes and uses the facts that

1. Rational operations performed on rational and irrational numbers give an irrational number
2. Rational operations performed on two irrational numbers may give either a rational or an irrational number

G. Distinguishes between rational and irrational numbers

H. Demonstrates a knowledge of and applies rules for simplifying radicals

I. Simplifies sums and differences involving radicals

J. Determines the real roots of equations involving radicals or powers

K. Multiplies polynomials containing radicals

L. Rationalizes denominator in simplifying radicals

M. Solves quadratic equations by

   1. Completing the square

   2. Quadratic formula

N. Gives the sum and product of the roots of quadratic equations by inspection

O. Uses the sum and product properties of roots to form quadratic equations having a given solution set

P. Uses discriminant to determine the number and nature of real roots of quadratic equations with rational coefficients

Q. Determines the solution set of an inequality and shows its graph on a number line

R. Solves and checks radical (irrational) equations

CHECKLIST

ALGEBRA II CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

VII. Irrational Numbers and Quadratic Equations

____ A. Defines terms contained in this unit

____ B. Determines number and nature of real n^{th} roots of a given number

____ C. Solves equations by extracting roots

____ D. States restrictions on values of variables so that radicals denote real numbers

____ E. Determines rational roots of equations

____ F. Recognizes the result of combining a rational with an irrational and of combining two irrational numbers

____ G. Distinguishes between rational and irrational numbers

____ H. Simplifies radicals

____ I. Adds and subtracts radicals

____ J. Solves equations involving radicals or powers

____ K. Multiplies polynomials containing radicals

____ L. Rationalizes denominator

____ M. Solves quadratic equations

____ N. Knows and uses sum and product properties of roots

____ O. Determines number and nature of real roots of quadratic equations

____ P. Solves inequalities and graphs solution set on number line

____ Q. Solves radical equations

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level B

VIII. Quadratic Relations and Systems

A. Defines

1. Parabola
2. Focus
3. Directrix
4. Ellipse
5. Focal radius
6. Hyperbola
7. Asymptote
8. Inverse variation
9. Combined variation

B. Has a working knowledge of the distance formula, the midpoint formula, and the Pythagorean theorem

C. Realizes that the product of the slopes of perpendicular lines is -1

D. Forms the equation of a line through a given point and perpendicular to a given line

E. Recognizes that $(x-h)^2 + (y-k)^2 = r^2$ is an equation of a circle with radius r and center (h,k)

F. Writes equation of a circle given

1. Center and radius
2. Center and a point on the circle

G. Graphs circles by plotting and by sketching

H. Recognizes standard forms of parabolas

I. Graphs parabolas by plotting points

J. Determines the equation of a parabola given the focus and directrix

K. Recognizes the standard forms for an ellipse

L. Sketches an ellipse using x- and y-intercepts

M. Forms the equation of an ellipse given the foci and the sum of the focal radii

N. Recognizes the standard forms of hyperbolas

O. Sketches hyperbolas by using asymptotes and intercepts (vertices)

P. Tells by inspection of an equation whether it is a circle, parabola, ellipse, or hyperbola

Q. Finds constant of proportionality and solves inverse variation problems

R. Solves systems of quadratics by

   1. Graphing

   2. Substitution

   3. Linear combination

S. Works verbal problems involving systems of quadratic equations

CHECKLIST

ALGEBRA II CONTINUUM

Level B

PUPIL _____ TEACHER _____

VIII. Quadratic Relations and Systems

___ A. Knows definitions

___ B. Has a working knowledge of the distance formula, the midpoint formula, and the Pythagorean theorem

___ C. Realizes that the product of the slopes of perpendicular lines is -1

___ D. Forms the equation of a line through a given point and perpendicular to a given line

___ E. Recognizes that $(x-h)^2 + (y-k)^2 = r^2$ is an equation of a circle with radius r and center (h,k)

___ F. Writes equation of a circle

___ G. Graphs circles

___ H. Recognizes standard forms of parabolas

___ I. Graphs parabolas

___ J. Determines the equation of a parabola

___ K. Recognizes the standard forms for an ellipse

___ L. Sketches an ellipse using x- and y-intercepts

___ M. Forms the equation of an ellipse

___ N. Recognizes the standard forms of hyperbolas

___ O. Sketches hyperbolas

___ P. Tells by inspection of an equation whether it is a circle, parabola, ellipse, or hyperbola

____ Q. Finds constant of proportionality and solves inverse variation problems

____ R. Solves systems of quadratics

____ S. Works verbal problems

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level B

IX. Exponential Functions and Logarithms

A. Defines

1. Exponential function
2. Logarithm
3. Logarithmic function
4. Common logarithm
5. Inverse relation
6. Mantissa
7. Characteristic
8. Antilogarithm
9. Interpolation

B. Knows the rules for working with fractional exponents

C. Uses rules for fractional exponents

1. To interchange radical and exponential forms
2. To simplify expressions
3. To solve equations

D. Graphs exponential and logarithmic functions (optional)

E. Equates exponential and logarithmic functions

F. States the characteristic of the logarithm by inspection and determines the mantissa from tables

G. Finds antilogarithm from tables and places decimal by inspection

H. Realizes that rules for computing with logarithms are basically the same as those for exponents

I. Multiplies, divides, raises to a power, and finds roots of numbers using logarithms

J. Solves and checks equations written in logarithmic or exponential form

K. Solves verbal problems using logarithms to shorten computation

CHECKLIST

ALGEBRA II CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

IX. Exponential Functions and Logarithms

____ A. Defines terms used in this unit

____ B. Knows and uses the rules for fractional exponents

____ C. Equates exponential and logarithmic functions

____ D. Finds logarithms

____ E. Finds antilogarithms

F. Uses logarithms to

____ 1. Multiply

____ 2. Divide

____ 3. Raise to a power

____ 4. Find roots of numbers

____ G. Solves and checks equations written in logarithmic or exponential form

____ H. Solves verbal problems using logarithms

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level B

X. Complex Numbers

A. Defines

1. Imaginary number

2. Pure imaginary number

3. Complex number

4. Equality of complex numbers

5. Vector

B. Plots numbers in complex plane

C. Adds and subtracts complex numbers using the rule for addition

D. Solves equations containing complex numbers

E. Displays a knowledge of

1. Identity elements

2. Additive inverse

3. The repeating pattern of the successive powers of $\underline{i}$

F. Simplifies a square root radical whose radicand is negative

G. Multiplies and divides complex numbers using the definition of multiplication and the concept of conjugate when necessary

H. Solves equations over the set of complex numbers

CHECKLIST

ALGEBRA II CONTINUUM

Level B

PUPIL _____ TEACHER _____

X. Complex Numbers

___ A. Defines terms associated with this unit

___ B. Plots numbers in complex plane

___ C. Adds and subtracts complex numbers

___ D. Solves equations containing complex numbers

E. Displays a knowledge of

___ 1. Identity elements

___ 2. Additive inverse

___ 3. Repeating pattern of the successive powers of i

___ F. Simplifies a square root radical whose radicand is negative

___ G. Multiplies and divides complex numbers

___ H. Solves equations over the set of complex numbers

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level B

*XI. Trigonometric Functions, Identities, Formulas, and Circular Functions

A. Reads positive and negative angles using appropriate terminology

B. Demonstrates a working knowledge of the six trigonometric functions

C. States by rote the numerical values of trigonometric functions of special angles

D. Finds values of trigonometric functions by use of tables

E. Expresses any angle as a function of a positive acute angle (reference angle)

F. Recognizes fundamental identities

G. Sketches graphs of trigonometric functions

*This unit is suggested for those high schools that do not teach trigonometry.

CHECKLIST

ALGEBRA II CONTINUUM

Level B

PUPIL _____ TEACHER _____

XI. Trigonometric Functions, Identities, Formulas, and Circular Functions

___ A. Reads positive and negative angles

___ B. Knows and uses the six trigonometric functions

___ C. States by rote the numerical values of trigonometric functions of special angles

___ D. Uses tables of trigonometric functions

___ E. Expresses an angle as a function of a positive acute angle (reference angle)

___ F. Recognizes fundamental identities

___ G. Graphs trigonometric functions

CURRICULUM GUIDE FOR MATHEMATICS

ALGEBRA II CONTINUUM

Level B

XII. Progressions and Binomial Expansions

A. Defines

1. Sequence
2. Term (of a sequence)
3. Arithmetic progression
4. Finite sequence
5. Infinite sequence
6. Arithmetic means
7. Geometric mean (mean proportional)
8. Series
9. Summation
10. Geometric progression
11. Factorial notation

B. Knows and uses symbols, abbreviations, and formulas associated with progressions

C. Writes terms of arithmetic progression and finds the n^{th} term

D. Finds and inserts a given number of arithmetic means

E. Finds sums of arithmetic progressions

F. Solves problems involving arithmetic progressions

G. Writes terms of geometric progressions and finds n^{th} term

H. Finds and inserts a designated number of geometric means

I. Finds sums of geometric progressions

J. Solves verbal problems involving geometric progressions

K. Expands binomials by using Binomial Theorem

L. Finds and simplifies a specified term of a binomial expansion

CHECKLIST

ALGEBRA II CONTINUUM

Level B

PUPIL _____ TEACHER _____

XII. Progressions and Binomial Expansions

___ A. Defines terms in this unit

___ B. Knows and uses symbols, abbreviations, and formulas

___ C. Writes terms of arithmetic progression and finds the n^{th} term

___ D. Finds and inserts a given number of arithmetic means

___ E. Finds sums of arithmetic progressions

___ F. Solves problems on arithmetic progressions

___ G. Writes terms of geometric progressions and finds n^{th} term

___ H. Finds and inserts a designated number of geometric means

___ I. Finds sums of geometric progressions

___ J. Solves problems using geometric progressions

___ K. Expands binomials

___ L. Finds and simplifies a specified term of a binomial expansion

ENRICHMENT

I. Polynomial Functions

II. Matrices and Determinants (See page 128 in the guide)

III. Permutations, Combinations, and Problems (pages 130 and 132)

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level A and Level B

INTRODUCTION

Although this curriculum guide is mainly self-explanatory, the teacher may find helpful the information that follows.

Because there are so many definitions, symbols, and abbreviations used in geometry, the committee felt it inadvisable to list all of them. Yet, because they are so essential to the mastery of geometry, a reminder to the teacher is placed at the beginning of each unit.

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level A

I. Elements of Geometry

A. Demonstrates a detailed knowledge of all the terms and definitions needed

B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

C. Describes basic undefined terms used

D. Applies the concept of one-to-one correspondence and the order property of numbers on the real number line

E. Works with absolute value to

1. Determine distance between two points on the number line

2. Determine the measure of an angle

3. Solve problems

F. Identifies and draws intersections of

1. Two lines

2. Line and plane

3. Two planes

G. Has a working knowledge of line segments, rays, and terms associated with them

H. Demonstrates an understanding of angles and related terms

I. Determines measure of angles by computation and by use of protractor

J. Classifies angles by measure or relationship

1. Acute
2. Right
3. Obtuse
4. Straight
5. Equal
6. Adjacent

7. Vertical
8. Complementary
9. Supplementary
10. Dihedral

K. Applies knowledge of angles to problem solving

CHECKLIST

GEOMETRY CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

I. Elements of Geometry

____ A. Demonstrates knowledge of terms and definitions needed

____ B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

____ C. Describes basic undefined terms used

____ D. Applies the concept of one-to-one correspondence and the order property of numbers

____ E. Works with absolute value

F. Identifies and draws intersections of

____ 1. Two lines

____ 2. Line and plane

____ 3. Two planes

____ G. Has a working knowledge of line segments, rays, and terms associated with them

____ H. Demonstrates an understanding of angles and related terms

____ I. Measures angles by computation and use of protractor

____ J. Classifies angles by measure or relationship

____ K. Solves problems involving angle measures

II. Induction, A Method of Discovery

A. Demonstrates a detailed knowledge of all the terms and definitions used

B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

C. Distinguishes between induction and intuition and draws conclusions when possible

D. Identifies special segments and angles related to a triangle

1. Exterior angle
2. Remote interior angles
3. Hypotenuse
4. Legs
5. Altitude
6. Perpendicular bisector
7. Bisector of an angle
8. Median

E. Classifies triangles according to sides or angles

F. Distinguishes between polygons and other geometric figures

G. Classifies special types of polygons

H. Works problems involving angle measures in polygons

I. Defines and classifies quadrilaterals and related terms

J. Discovers relationships of polygons and related segments by drawing diagrams

K. Demonstrates a knowledge of the circle and its related points, lines, and segments

L. Identifies and illustrates circles in relation to other figures

M. Distinguishes between spheres and circles

N. Demonstrates a knowledge of the sphere and its related points lines, segments, and planes

CHECKLIST

GEOMETRY CONTINUUM

Level A

PUPIL _____ TEACHER _____

II. Induction, A Method of Discovery

___ A. Demonstrates a detailed knowledge of all the terms and definitions used

___ B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

___ C. Distinguishes between induction and intuition and draws conclusions when possible

___ D. Identifies special segments and angles related to a triangle

___ E. Classifies triangles according to sides or angles

___ F. Distinguishes between polygons and other geometric figures

___ G. Classifies special types of polygons

___ H. Works problems involving angle measures in polygons

___ I. Defines and classifies quadrilaterals and related terms

___ J. Discovers relationships of polygons and related segments by drawing diagrams

___ K. Demonstrates a knowledge of the circle and its related points, lines, and segments

___ L. Identifies and illustrates circles in relation to other figures

___ M. Distinguishes between spheres and circles

___ N. Demonstrates a knowledge of the sphere and its related points, lines, segments, and planes

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level A

III. Deduction and Proof

A. Demonstrates a detailed knowledge of all the terms and definitions needed

B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

C. Distinguishes between deduction and other types of thinking

D. Identifies hypothesis and conclusion and expresses statements in "if-then" form

E. Draws conclusions based on deduction

F. Discovers the relationship between a given statement, its converse, its inverse, and its contrapositive (optional)

G. Recognizes a good definition

H. Knows and uses the properties of the real number system

I. States by rote the postulates and theorems concerning points, lines, and planes

J. Selects the postulate or theorem which justifies a given statement

K. Extends the application of postulates and theorems to the number line

L. Studies sample proofs in preparation for original proofs

M. Draws and labels a diagram for each geometric proof

N. Writes simple proofs, noting that only definitions, postulates, or previously proved theorems are acceptable to support assertions

CHECKLIST

GEOMETRY CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

III. Deduction and Proof

____ A. Demonstrates a detailed knowledge of all the terms and definitions needed

____ B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

____ C. Distinguishes between deduction and other types of thinking and draws conclusions based on deduction

____ D. Identifies hypothesis and conclusion and expresses statements in "if-then" form

____ E. Knows and uses the properties of the real number system

____ F. States by rote the postulates and theorems concerning points, lines, and planes

____ G. Selects the postulate or theorem which justifies a given statement

____ H. Extends the application of postulates and theorems to the number line

____ I. Writes simple proofs including diagrams if needed

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level A

IV. Angle Relationships; Perpendicular Lines

A. Demonstrates a working knowledge of postulates relating to angles

B. Defines betweenness of rays

C. Knows and uses theorems of this unit in solving problems and constructing proofs

D. Arranges in order the six essential parts in the demonstration of a theorem

E. Inventories useful statements concerning angles and perpendicular lines

F. Summarizes methods for proving two angles equal

CHECKLIST

GEOMETRY CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

IV. Angle Relationships; Perpendicular Lines

____ A. Demonstrates a working knowledge of postulates relating to angles

____ B. Defines betweenness of rays

____ C. Knows and uses theorems of this unit in solving problems and constructing proofs

____ D. Arranges in order the six essential parts in the demonstration of a theorem

____ E. Inventories useful statements concerning angles and perpendicular lines

____ F. Summarizes methods for proving two angles equal

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level A

V. Parallel Lines and Planes

A. Demonstrates a detailed knowledge of all the terms and definitions needed

B. Recognizes and uses abbreviations and special geometric vocabulary

C. Uses visual aids and models to better understand the relationships between lines and planes in space

D. Applies postulates and theorems pertaining to parallel planes and lines in solving problems and constructing proofs

E. Identifies and works with special angles formed by transversals and parallel lines

F. Follows the suggested form in developing an indirect proof

G. States by rote the Parallel Postulate

H. Draws and uses auxiliary lines

I. Proves that lines are parallel if

1. Corresponding angles are equal

2. Alternate interior angles are equal

3. In a plane, two lines are perpendicular to a third line

4. Two interior angles on the same side of the transversal are supplementary

J. Demonstrates a working knowledge of the angle relationships in triangles such as

1. Sum of the angles of a triangle

2. Measure of an angle of an equiangular triangle

3. Measure of exterior angle of a triangle

CHECKLIST

GEOMETRY CONTINUUM

Level A

PUPIL _____ TEACHER _____

V. Parallel Lines and Planes

____ A. Demonstrates a detailed knowledge of all terms and definitions needed

____ B. Recognizes and uses abbreviations and special geometric vocabulary

____ C. Applies postulates and theorems pertaining to parallel planes and lines in solving problems and constructing proofs

____ D. Identifies and works with special angles formed by transversals and parallel lines

____ E. Follows the suggested form in developing an indirect proof

____ F. States by rote the Parallel Postulate

____ G. Proves that lines are parallel

____ H. Demonstrates a working knowledge of the angle relationships in triangles

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level I

VI. Congruent Triangles

A. Demonstrates a detailed knowledge of all terms and definitions needed

B. Recognizes and uses abbreviations, symbols, and geometric vocabulary

C. Identifies corresponding parts of two triangles

D. Explores the concept of congruence

E. Proves triangles congruent by

1. SSS
2. SAS
3. ASA
4. AAS

F. Proves right triangles congruent by

1. HL
2. LL
3. HA
4. LA

G. Uses congruent triangles to prove corresponding parts equal (CPCTE)

H. Realizes that an auxiliary line is determined if exactly one line can be drawn to meet the conditions

I. Knows and uses the theorem and its converse concerning base angles of an isosceles triangle

J. Knows and applies the meaning of the word <u>distance</u>

1. From a point to a line (or a plane)
2. Between two parallel lines
3. From a point to a figure

K. Summarizes and uses defined and proved properties of quadrilaterals

1. Isosceles trapezoid
2. Parallelogram
3. Rectangle
4. Rhombus
5. Square

L. Discusses practical applications of congruent triangles

CHECKLIST

GEOMETRY CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

VI. Congruent Triangles

____ A. Demonstrates knowledge of terms and definitions

____ B. Recognizes and uses abbreviations, symbols, and geometric vocabulary

____ C. Identifies corresponding parts of two triangles

____ D. Proves triangles congruent

____ E. Uses congruent triangles to prove corresponding parts equal

____ F. Realizes that an auxiliary line is determined if exactly one line can be drawn to meet the conditions

____ G. Knows and uses the theorem and its converse concerning base angles of an isosceles triangle

____ H. Knows and applies the meaning of the word <u>distance</u>

____ I. Summarizes and uses properties of various quadrilaterals

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level B

VII. Similar Polygons

A. Demonstrates a detailed knowledge of all the terms and definitions needed

B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

C. Uses ratio and proportion in problem solving

D. Recognizes and uses special properties of a proportion

1. Means-extremes product property

2. Equivalent-form property

3. Denominator-addition property

4. Denominator-subtraction property

5. Numerator-denominator sum property of equal ratios

E. Demonstrates an understanding of the meaning and use of similarity in polygons

F. Proves triangles similar and uses the concept of similarity in problem solving

G. Knows and applies relationships of special segments in a triangle

H. Describes the projection of a point on a line and a segment on a line in the same plane

I. Discovers and applies the relationships which exist when an altitude is drawn to the hypotenuse of a right triangle

J. Relates a knowledge of the Pythagorean Theorem and its converse to problem solving

K. Extends the application of the Pythagorean Theorem to

1. The 30-60-90 triangle

2. The 45-45-90 triangle

3. The easily recognized Pythagorean triples such as 3n, 4n, 5n and 5n, 12n, 13n

L. Visualizes three-dimensional figures and works problems using the Pythagorean Theorem

CHECKLIST

GEOMETRY CONTINUUM

Level B

PUPIL _____ TEACHER _____

VII. Similar Polygons

___ A. Demonstrates a detailed knowledge of all the terms and definitions needed

___ B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

___ C. Uses ratio and proportion to solve problems

___ D. Recognizes and uses special properties of a proportion

___ E. Demonstrates an understanding of the meaning and use of similarity in polygons

___ F. Proves triangles similar and uses the concept of similarity in problem solving

___ G. Knows and applies relationships of special segments in a triangle

___ H. Describes projections of points and segments

___ I. Applies the relationships which exist when an altitude is drawn to the hypotenuse of a right triangle

___ J. Relates a knowledge of the Pythagorean Theorem and its converse to problem solving

___ K. Extends the application of the Pythagorean Theorem to special triangles

___ L. Visualizes three-dimensional figures and works problems using the Pythagorean Theorem

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level B

VIII. Circles, Arcs and Angles

A. Demonstrates a detailed knowledge of all the terms and definitions needed

B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

C. Interprets the Arc-Addition Postulate

D. States and uses the relationship between central angles and their arcs

E. Measures angles that are

1. Inscribed in circles

2. Formed by a tangent and a secant drawn from a point on a circle

3. Formed by two secants, or two tangents, or a secant and a tangent intersecting outside a circle

4. Formed by two secants intersecting within a circle

F. Extends the concept of angle measurement to include

1. An angle inscribed in a semicircle

2. A quadrilateral inscribed in a circle

3. Inscribed angles intercepting the same or equal arcs

4. A diameter drawn to a point of contact

G. Applies the theorem that a diameter perpendicular to a chord bisects the chord and its two arcs

H. Determines lengths of line segments and derives proofs when

1. Two chords intersect within a circle

2. Two secants, or a tangent and a secant, are drawn to a circle from an outside point

CHECKLIST

GEOMETRY CONTINUUM

Level B

PUPIL _____ TEACHER _____

VIII. Circles, Arcs, and Angles

___ A. Demonstrates a detailed knowledge of all the terms and definitions needed

___ B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

___ C. Interprets the Arc-Addition Postulate

___ D. States and uses the relationship between central angles and their arcs

E. Measures angles that are

___ 1. Inscribed in circles

___ 2. Formed by a tangent and a secant drawn from a point on a circle

___ 3. Formed by two secants, or two tangents, or a secant and a tangent intersecting outside a circle

___ 4. Formed by two secants intersecting within a circle

F. Extends the concept of angle measurement to include

___ 1. An angle inscribed in a semicircle

___ 2. A quadrilateral inscribed in a circle

___ 3. Inscribed angles intercepting the same or equal arcs

___ 4. A diameter drawn to a point of contact

___ G. Applies the theorem that a diameter perpendicular to a chord bisects the chord and its two arcs

H. Determines lengths of line segments and derives proofs when

____ 1. Two chords intersect within a circle

____ 2. Two secants, or a tangent and a secant, are drawn to a circle from an outside point

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level B

IX. Constructions and Loci

A. Distinguishes between a drawing and a construction

B. Recognizes that the unmarked straightedge and a compass are the only instruments used for construction purposes

C. Illustrates the six parts of a complete solution to a construction problem

1. A Statement

2. The Given

3. The To Construct

4. The Constructed figure

5. Steps

6. Justification

D. Constructs

1. An angle equal to a given angle

2. A ray which bisects a given angle

3. A segment equal to a given segment

4. A line perpendicular to a given line at a given point on the line

5. A perpendicular to a given line from a given point outside the line

6. The perpendicular bisector of a given segment

7. A line parallel to a given line through a given point not on the line

8. A line which bisects a given arc of a circle

9. The tangent to a given circle at a given point of the circle

10. The tangents to a given circle from a given external point

11. A circle which circumscribes a given triangle

12. A circle which is inscribed in a given triangle

E. Divides a given segment into any given number of equal parts

F. Constructs a segment whose length is the fourth proportional to the lengths of three given segments

G. Constructs a segment whose length is the mean proportional between the lengths of two given segments

H. Defines locus

I. Illustrates the solution to a locus problem by the use of a diagram and a word description

J. Finds the locus of points which satisfy one or more given conditions

K. Determines the solution of construction exercises by means of loci

CHECKLIST

GEOMETRY CONTINUUM

Level B

PUPIL _____ TEACHER _____

IX. Constructions and Loci

___ A. Distinguishes between a drawing and a construction

___ B. Recognizes and uses the only two instruments permissible for construction purposes

___ C. Illustrates the six parts of a complete solution to a construction problem

D. Constructs

___ 1. An angle equal to a given angle

___ 2. A ray which bisects a given angle

___ 3. A segment equal to a given segment

___ 4. A line perpendicular to a given line at a point in the line

___ 5. A perpendicular to a given line from a point outside the line

___ 6. The perpendicular bisector of a segment

___ 7. A line parallel to a given line through a given point not on the line

___ 8. A line which bisects an arc of a circle

___ 9. The tangent to a circle at a given point of the circle

___ 10. The tangents to a given circle from a given external point

___ 11. A circle which circumscribes a given triangle

___ 12. A circle which is inscribed in a given triangle

___ E. Divides a given segment into any given number of equal parts

___ F. Constructs a segment whose length is the fourth proportional to the lengths of three given segments

____ G. Constructs a segment whose length is the mean proportional between the lengths of two given segments

____ H. Defines locus

____ I. Illustrates the solution to a locus problem using diagram and word description

____ J. Finds the locus of points which satisfy one or more given conditions

____ K. Solves construction exercises by means of loci

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level B

X. Coordinate Geometry-Methods

A. Demonstrates a detailed knowledge of all the terms and definitions needed

B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

C. Plots points on the number line and in the coordinate plane

D. Demonstrates a knowledge of symmetry with respect to a point, a line, and a plane

E. Draws graphs in the coordinate plane using the conditions stated

F. Calculates by use of formulas

1. The distance between two points

2. The midpoint of the segment joining two points

G. Recognizes and uses the fact that the circle with center (a,b) and radius r has the equation $(x-a)^2 + (y-b)^2 = r^2$

H. Finds the slope of a line by use of the formula

I. Tells whether the slope appears to be positive, negative, zero, or not defined

J. Specifies the relationship between the slopes of two nonvertical lines as being

1. Equal, if and only if, the lines are parallel

2. Negative reciprocals, if and only if, the lines are perpendicular

K. Notes the standard linear equation is written in the form $ax + by = c$

L. Writes the equation of a line

1. When given a point (x_1, y_1) and the slope (m) by using $y - y_1 = m(x - x_1)$

2. When given two points

3. Through a given point and parallel to a given line

4. Through a given point and perpendicular to a given line

M. Solves systems of equations by an algebraic method

CHECKLIST

GEOMETRY CONTINUUM

Level B

PUPIL _____ TEACHER _____

X. Coordinate Geometry—Methods

___ A. Demonstrates a detailed knowledge of all terms and definitions needed

___ B. Recognizes and uses symbols, abbreviations, and special geometric vocabulary

___ C. Plots points on the number line and in the coordinate plane

___ D. Demonstrates a knowledge of symmetry with respect to a point, a line, and a plane

___ E. Draws graphs in the coordinate plane using the conditions stated

F. Calculates by use of formulas

___ 1. The distance between two points

___ 2. The midpoint of the segment joining two points

___ G. Recognizes and uses the fact that the circle with center (a,b) and radius r has the equation $(x-a)^2 + (y-b)^2 = r^2$

___ H. Finds the slope of a line by use of the formula

___ I. Recognizes the slope as being positive, negative, zero, or not defined

___ J. Specifies the relationship between the slopes of two nonvertical lines

___ K. Writes the equation of a line

___ L. Solves systems of equations by an algebraic method

CURRICULUM GUIDE FOR MATHEMATICS

GEOMETRY CONTINUUM

Level B

XI. Areas and Volumes

A. Defines terms needed in finding areas

B. Writes formulas and computes areas of

1. Rectangle
2. Square
3. Parallelogram
4. Triangle
5. Trapezoid
6. Rhombus
7. Regular polygon
8. Circle

C. Compares areas of two similar polygons

D. Defines terms needed in finding total (surface) areas and volumes of solids

E. Writes formulas and computes total areas and volumes of

1. Prism
2. Pyramid
3. Cylinder
4. Cone
5. Sphere

F. Compares areas and volumes of similar solids

CHECKLIST

GEOMETRY CONTINUUM

Level B

PUPIL _____ TEACHER _____

XI. Areas and Volumes

____ A. Defines terms needed in finding areas

____ B. Writes formulas and computes areas of polygons and circles

____ C. Compares areas of two similar polygons

____ D. Defines terms needed in finding total areas and volumes of solids

____ E. Writes formulas and computes total areas and volumes of solids

____ F. Compares areas and volumes of similar solids

ENRICHMENT

I. Elements of Logic (See page 119 in the guide)

II. Coordinate Geometry-Proofs

III. Vectors

CURRICULUM GUIDE FOR MATHEMATICS

TRIGONOMETRY CONTINUUM

CURRICULUM GUIDE FOR MATHEMATICS

TRIGONOMETRY CONTINUUM

I. Trigonometric Functions for Acute Angles—the Right Triangle

A. Distinguishes between trigonometric and algebraic functions

B. Recognizes that the domain of a trigonometric function is a set of angles

C. States by rote the six trigonometric functions of an acute angle in a right triangle

D. Discovers which are the increasing and which are the decreasing functions in the first quadrant

E. Writes the trigonometric functions in abbreviated form and finds numerical values from tables, interpolating when necessary

F. Explains and illustrates angles of elevation and depression

G. Sketches diagrams and solves verbal problems using trigonometric ratios

H. Finds measure of an angle, given the numerical value of a trigonometric function

I. Identifies and uses cofunctions

1. Sine—cosine

2. Tangent—cotangent

3. Secant—cosecant

J. Identifies and applies reciprocal functions

1. Sine—cosecant

2. Cosine—secant

3. Tangent—cotangent

K. Finds all functions of an angle when one function is given

L. Draws a right triangle to find the numerical values of the functions for angles of 30°, 45°, and 60°

M. Applies from memory the numerical values of the functions of the special angles (30°, 45°, 60°) to simplify expressions and solve problems

N. Defines vectors

O. Recognizes and applies the two methods used to express direction or bearing

CHECKLIST

TRIGONOMETRY CONTINUUM

_____ PUPIL

_____ TEACHER

I. Trigonometric Functions for Acute Angles—the Right Triangle

____ A. Distinguishes between trigonometric and algebraic functions

____ B. Recognizes that the domain of a trigonometric function is a set of angles

____ C. States by rote the six trigonometric functions of an acute angle in a right triangle

____ D. Knows which are the increasing and which are the decreasing functions in the first quadrant

____ E. Writes the trigonometric functions in abbreviated form and finds numerical values from tables

____ F. Explains and illustrates angles of elevation and depression

____ G. Sketches diagrams and solves verbal problems using trigonometric ratios

____ H. Finds measure of an angle, given the numerical value of a trigonometric function

____ I. Identifies and uses cofunctions

____ J. Identifies and applies reciprocal functions

____ K. Finds all functions of an angle when one function is given

____ L. Applies from memory the numerical values of the functions of the special angles to simplify expressions and solve problems

____ M. Defines vectors

____ N. Recognizes and applies the two methods used to express direction or bearing

II. Trigonometric Functions for Angles of any Size

A. Defines

1. General angle
2. Positive angle
3. Negative angle
4. Initial side
5. Terminal side
6. Quadrantal angles
7. Coterminal angles
8. Standard position
9. Radius vector
10. Reference angle
11. Triangle of reference

B. Notes the Greek letters used to represent angles

C. Represents by diagrams angles greater than 360°, angles in standard position, and triangles of reference

D. Knows and uses the signs of the trigonometric functions for any angle

E. Obtains numerical values of functions for angles greater than 90° by either method

F. Converts functions of negative angles to functions of positive angles and finds numerical values

G. States by rote and applies the numerical values of the functions of quadrantal angles

H. Discovers the line representations of the trigonometric functions in terms of a unit circle

I. Has a working knowledge of the limits of variation of the trigonometric functions for angles from 0° to 360°

CHECKLIST

TRIGONOMETRY CONTINUUM

PUPIL _____ TEACHER _____

II. Trigonometric Functions

___ A. Defines needed terms

___ B. Represents angles and triangles by diagrams

___ C. Knows and uses the signs of trigonometric functions for any angle

___ D. Obtains numerical values of functions for angles greater than 90°

___ E. Converts functions of negative angles to functions of positive angles and finds numerical values

___ F. Knows and uses numerical values of functions of quadrantal angles

___ G. Knows limits of variation of the trigonometric functions for angles from 0° to 360°

CURRICULUM GUIDE FOR MATHEMATICS

TRIGONOMETRY CONTINUUM

III. Circular Measure

A. Defines

1. Circular measure
2. Sexagesimal units
3. Radian
4. Angular velocity
5. Linear velocity
6. Mil

B. Knows and uses abbreviations and formulas having to do with circular measure

C. Memorizes conversion units for degrees, mils, and radians

D. Interchanges degrees

1. With π radians
2. With radians
3. With mils

E. Simplifies functions when angle is given in radian measure

F. Solves verbal problems involving

1. Arc length
2. Linear velocity
3. Angular velocity
4. Area of a sector of a circle
5. Angles measured in mils

CHECKLIST

TRIGONOMETRY CONTINUUM

PUPIL _____ TEACHER _____

III. Circular Measure

___ A. Defines needed terms

___ B. Knows and uses abbreviations and formulas

___ C. Memorizes conversion units for degrees, mils, and radians

D. Interchanges degrees

___ 1. With π radians

___ 2. With radians

___ 3. With mils

___ E. Simplifies functions when angle is given in radian measure

F. Solves verbal problems involving

___ 1. Arc length

___ 2. Linear velocity

___ 3. Angular velocity

___ 4. Area of a sector of a circle

___ 5. Angle measures in mils

IV. Graphs; Inverse Functions

A. Defines

1. Periodic function
2. Period
3. Cycle
4. Frequency
5. Amplitude
6. Composite graph
7. Inverse function
8. Principal value
9. Discontinuous
10. Phase displacement

B. Identifies period and amplitude of trigonometric functions

C. Tells which trigonometric functions have continuous graphs and which have discontinuous graphs

D. Locates points of discontinuity

E. Graphs trigonometric functions by preparing a table of values and by sketching

F. Recognizes and graphs functions which have a phase displacement

G. Plots multiple graphs of trigonometric functions on a plane to determine similarities and variations

1. Between functions and cofunctions
2. Between functions and reciprocal functions
3. Among the six functions

H. Sketches graphs of the form $y = a \sin b\theta$

I. Draws composite graphs

J. Recognizes and uses the two symbols that denote inverse functions

K. Finds positive and negative values of angles, given an inverse function

L. Graphs inverse functions by preparing a table of values and by sketching

M. Graphs functions and their inverses in the same plane to determine their similarities and variations

CHECKLIST

TRIGONOMETRY CONTINUUM

PUPIL _____ TEACHER _____

IV. Graphs: Inverse Functions

____ A. Defines terms needed in this unit

____ B. Identifies period and amplitude of trigonometric functions

____ C. Recognizes continuity and discontinuity in graphs

____ D. Locates points of discontinuity

____ E. Graphs trigonometric functions

____ F. Recognizes and graphs functions which have a phase displacement

____ G. Plots multiple graphs of trigonometric functions to determine similarities and variations

____ H. Sketches graphs of the form $y = a \sin b\theta$

____ I. Draws composite graphs

____ J. Recognizes and uses the two symbols for inverse functions

____ K. Finds positive and negative values of angles, given an inverse function

____ L. Graphs inverse functions

____ M. Graphs functions and their inverses to determine their similarities and variations

V. Trigonometric Equations—Identical and Conditional

A. Defines and differentiates between identical equations (identities) and conditional equations

B. States by rote the eight fundamental identities

1. Pythagorean relations

2. Reciprocal relations

3. Quotient relations

C. Simplifies expressions using the eight fundamental identities

D. Proves identities using the following suggestions

1. Begins by transforming the more complicated member to a simpler form

2. Makes substitutions from the eight fundamental identities, keeping the expression simplified by means of algebraic reductions

3. Expresses all functions in terms of sines and cosines if no other method is successful

4. Works with each member separately to avoid the common error of assuming the two members are equal

E. Notes the similarity between algebraic equations and trigonometric equations

F. Solves trigonometric equations for solutions within a given domain

G. Notes and rejects apparent roots impossible of interpretation (absurd roots)

H. Verifies solution set by substitution

CHECKLIST

TRIGONOMETRY CONTINUUM

PUPIL _____ TEACHER _____

V. Trigonometric Equations—Identical and Conditional

____ A. Defines and differentiates between identical equations and conditional equations

____ B. States by rote the eight fundamental identities

____ C. Simplifies expressions using the eight fundamental identities

____ D. Proves identities

____ E. Solves trigonometric equations

____ F. Checks for valid roots

CURRICULUM GUIDE FOR MATHEMATICS

TRIGONOMETRY CONTINUUM

VI. Oblique Triangles

A. Reviews previously learned facts about logarithms as outlined in Algebra II Continuum

B. Finds logarithms of trigonometric functions from tables

C. Defines oblique triangle

D. Commits to memory the law of sines

E. Recognizes that the law of sines is used in the solution of oblique triangles when given

1. Two angles and a side opposite one of them

2. Two sides and an angle opposite one of them

F. Tests data before using law of sines to determine whether there will be one solution, two solutions, or no solution

G. Uses law of sines to solve for the remaining parts of an oblique triangle

H. Commits to memory the law of cosines

I. Recognizes that the law of cosines is used in the solution of oblique triangles when given

1. Two sides and the included angle

2. Three sides

J. Uses law of cosines to solve for the remaining parts of an oblique triangle

K. Knows formulas and finds areas of triangles when given

1. Two sides and the included angle

2. Three sides

L. Demonstrates a knowledge of vectors, components, and resultants and applies this knowledge to problem solving

M. Has a working knowledge of the law of tangents

N. Recognizes the formulas for functions of half-angles in a triangle

O. Recognizes that Mollweide's formula can be used to check solutions of oblique triangles

P. Uses logarithms as an aid in solving oblique triangles

CHECKLIST

TRIGONOMETRY CONTINUUM

PUPIL _____ TEACHER _____

VI. Oblique Triangles

____ A. Finds logarithms of trigonometric functions

____ B. Defines oblique triangle

____ C. Knows and uses the law of sines in solving oblique triangles

____ D. Tests data to determine number of solutions for an oblique triangle

____ E. Knows and uses the law of cosines in solving oblique triangles

____ F. Knows formulas and finds areas of oblique triangles

____ G. Solves problems about vectors, components, and resultants

____ H. Uses logarithms as an aid in solving oblique triangles

VII. Functions of Two Angles

A. States by rote the formulas for the functions of the sum and difference of two angles

1. Sine

2. Cosine

3. Tangent

B. Uses the sum and difference formulas to

1. Form equivalent expressions

2. Evaluate expressions

3. Find functions of angles without use of tables

4. Prove identities

5. Solve equations

C. States by rote the formulas for the functions of twice an angle (double-angle formulas)

1. Sine

2. Cosine (three forms)

3. Tangent

D. Uses the double-angle formulas to

1. Form equivalent expressions

2. Evaluate expressions

3. Find functions of angles without use of tables

4. Prove identities

5. Solve equations

E. States by rote the formulas for functions of half-angles (half-angle formulas)

1. Sine

2. Cosine

3. Tangent

F. Uses the half-angle formulas to

1. Form equivalent expressions

2. Evaluate expressions

3. Find functions of angles without use of tables

4. Prove identities

5. Solve equations

G. Converts products of functions into sums or differences of functions

H. Converts sums or differences of functions into products of functions

CHECKLIST

TRIGONOMETRY CONTINUUM

PUPIL _____ TEACHER _____

VII. Functions of Two Angles

____ A. States by rote the formulas for the functions of the sum and difference of two angles

____ B. Uses the sum and difference formulas

____ C. States by rote the formulas for the functions of twice an angle

____ D. Uses the double-angle formulas

____ E. States by rote the formulas for functions of half-angles

____ F. Uses the half-angle formulas

____ G. Converts products of functions into sums or differences of functions

____ H. Converts sums or differences of functions into products of functions

VIII. Complex Numbers and Polar Coordinates

A. Recalls pertinent facts about complex numbers

1. Definitions
2. Equality
3. Operations
4. Graphic representation

B. Defines

1. Polar coordinate system
2. Polar coordinates (r,θ)
3. Polar form of a complex number (cis θ)
4. Modulus (absolute value)
5. Amplitude (argument)

C. Derives the relationship between rectangular coordinates (x,y) and polar coordinates (r,θ) from a right triangle diagram

D. Determines modulus and amplitude

E. Writes complex numbers in polar form

F. Obtains polar equivalents for complex numbers

G. Recognizes the advantages of using polar form in finding products, quotients, powers, and roots of complex numbers

H. Applies theorems to multiply or divide complex numbers in polar form

I. Uses De Moivre's Theorem to find powers and roots of complex numbers in polar form

J. Graphs equations in the polar coordinate plane

CHECKLIST

TRIGONOMETRY CONTINUUM

PUPIL _____ TEACHER _____

VIII. Complex Numbers and Polar Coordinates

____ A. Defines needed terms

____ B. Derives the relationship between rectangular coordinates and polar coordinates from a right triangle diagram

____ C. Determines modulus and amplitude

____ D. Writes complex numbers in polar form

____ E. Obtains polar equivalents for complex numbers

____ F. Applies theorems to multiply or divide complex numbers in polar form

____ G. Uses De Moivre's Theorem to find powers and roots of complex numbers in polar form

____ H. Graphs equations in the polar coordinate plane

ENRICHMENT

I. The Slide Rule

II. Lines, Circles, and Conics in Polar Coordinates

CURRICULUM GUIDE FOR MATHEMATICS

ADVANCED MATHEMATICS CONTINUUM

CURRICULUM GUIDE FOR MATHEMATICS

ADVANCED MATHEMATICS CONTINUUM

I. Logic

A. Defines

1. Proposition
2. Antecedent
3. Consequent
4. Conjunction
5. Disjunction
6. Implication
7. Equivalence
8. Negation
9. Abstraction
10. Quantifier
11. Tautology
12. Truth table
13. Converse
14. Inverse
15. Contrapositive

B. Recognizes and uses symbols pertaining to logic

C. Examines the logical structure of a mathematical system

D. Combines two propositions to form a conjunction, a disjunction, or an implication

E. Forms the negation of a given proposition

F. Determines under what conditions a conjunction, a disjunction, an implication, or an equivalence is true

G. Recognizes implied or stated quantifiers in mathematical propositions

H. Constructs truth tables to determine whether a proposition is true

I. Uses truth tables to establish rules for negations

J. Writes the negation of a compound proposition

K. Derives implications from other implications

1. Converse

2. Inverse

3. Contrapositive

L. Concludes from truth tables that

1. The converse of a true implication is not always true

2. The inverse of a true implication is not always true

3. The implication and its contrapositive are simultaneously true or false

M. Interchanges implications written in the "if-then" form with those written in "sufficient-necessary" form

N. Constructs direct and indirect proofs for propositions

O. Recognizes and uses the two methods of disproof

1. Counterexample

2. Contradiction

P. Uses logical reasoning to test validity of conclusions

Q. Supplies necessary propositions to set up a logical structure, or to make a logical sequence

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

_____ PUPIL

_____ TEACHER

I. Logic

____ A. Defines terms used in logic

____ B. Recognizes and uses appropriate symbols

____ C. Forms conjunctions, disjunctions, implications, and negations

____ D. Determines under what conditions a conjunction, a disjunction, an implication, or an equivalence is true

____ E. Recognizes implied or stated quantifiers

____ F. Constructs and uses truth tables

____ G. Writes negation of a compound proposition

____ H. Derives implications from other implications

____ I. Interchanges implications written in the "if-then" form with those written in "sufficient-necessary" form

____ J. Constructs direct and indirect proofs

____ K. Recognizes and uses two methods of disproof

____ L. Tests validity of conclusions

____ M. Supplies necessary propositions to set up a logical structure, or to make a logical sequence

II. Number Fields

A. Has a working knowledge of properties of the real number system

B. Recognizes and uses the properties of zero in division

1. If $a \neq 0$, then $0/a = 0$

2. If $a \neq 0$, then $a/0$ is meaningless

3. The symbol $0/0$ is indeterminate

C. Defines a field as being an abstract mathematical system containing undefined terms, two operations, and eleven axioms

D. Applies the concept of a field to problem solving

E. Defines the terms congruence, modulus, and finite fields

F. Writes and uses addition and multiplication tables for modulo arithmetic

G. Identifies the additional properties needed for an ordered field

H. Defines upper bound and least upper bound

I. Identifies the additional property for a complete ordered field

J. Demonstrates an understanding of the axiom of mathematical induction

K. Proves or disproves statements by mathematical induction

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

PUPIL _____ TEACHER _____

II. Number Fields

____ A. Has a working knowledge of properties of the real number system

____ B. Recognizes and uses the properties of zero in division

____ C. Defines a field

____ D. Applies the concept of a field to problem solving

____ E. Defines congruence, modulus, and finite fields

____ F. Writes and uses addition and multiplication tables for modulo arithmetic

____ G. Identifies additional properties needed for an ordered field

____ H. Defines upper bound and least upper bound

____ I. Identifies additional property for a complete ordered field

____ J. Demonstrates an understanding of the axiom of mathematical induction

____ K. Proves or disproves statements by mathematical induction

III. Groups

A. Defines a group as an abstract mathematical system containing undefined elements, one undefined operation, and four axioms

B. Identifies the additional axiom needed for a commutative (Abelian) group

C. Inspects examples of groups to identify inverses (a', b', etc.) and the identity element (e)

D. Determines when a given set under a given operation does or does not form a group

E. Proves theorems and statements involving group operations

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

PUPIL _____ TEACHER _____

III. Groups

____ A. Defines a group

____ B. Identifies an Abelian group

____ C. Identifies inverses and the identity element

____ D. Determines when a given set under a given operation does or does not form a group

____ E. Proves theorems and statements involving group operations

IV. Number Bases Other Than Ten

A. Writes base ten numerals in polynomial form

B. Indicates a knowledge of place value in other number bases

C. Counts in other number bases

D. Recognizes names used to denote other number bases such as binary and duodecimal and two new digit symbols used in duodecimal system

E. Interchanges base ten numerals with numerals in other bases

F. Adds, subtracts, multiplies, and divides in other number bases

G. Concludes that the study of other number bases helps to better understand the base ten system

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

_____ PUPIL

_____ TEACHER

IV. Number Bases Other Than Ten

____ A. Writes base ten numerals in polynomial form

____ B. Indicates a knowledge of place value in other number bases

____ C. Counts in other number bases

____ D. Recognizes names used to denote other number bases

____ E. Interchanges base ten numerals with numerals in other bases

____ F. Adds, subtracts, multiplies, and divides in other number bases

V. Matrices and Determinants

A. Defines

1. Matrix
2. Dimensions (of a matrix)
3. Row matrix
4. Column matrix
5. Zero matrix
6. Identity matrix
7. Determinant
8. Order of a determinant
9. Minor of an element
10. Scalar

B. States dimensions of given matrices

C. Defines and writes the transpose of a given matrix, noting the symbol used

D. Performs matrix addition, scalar multiplication, and matrix multiplication

E. Finds the inverse of a given matrix if $\delta(A) \neq 0$

F. Solves systems of two equations by use of matrices

G. Evaluates determinants by using either the diagonal method or expansion by minors

H. Knows and applies properties of determinants

I. Solves systems of linear equations by using Cramer's Rule

J. Verifies roots of equations by substitution

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

PUPIL _____ TEACHER _____

V. Matrices and Determinants

____ A. Defines terms associated with unit

____ B. States dimensions of given matrices

____ C. Defines and writes the transpose of a matrix

____ D. Performs matrix addition, scalar multiplication, and matrix multiplication

____ E. Finds inverse of a given matrix

____ F. Solves systems of two equations by use of matrices

____ G. Evaluates determinants

____ H. Knows and applies properties of determinants

____ I. Solves systems of linear equations by using Cramer's Rule

____ J. Verifies roots of equations by substitution

VI. Permutations and Combinations

A. Defines a permutation of n objects as being an arrangement of these objects in a particular order

B. Recognizes and uses the special notation associated with permutations

C. Defines n factorial (n !) and zero factorial (0 !) and notes that factorials are defined only for non-negative integers

D. Has a working knowledge of the Fundamental Principle of permutations

E. Solves permutation problems of the following types:

1. Linear permutations of n objects, all different

2. Linear permutations of n objects, with some objects alike

3. Linear permutations of n objects, taken r at the time ($r < n$)

4. Circular permutations

F. Defines a combination as being an arrangement of objects in which order is not considered

G. Recognizes and uses special notation associated with combinations

H. Knows and uses the formula for working simple combinations

I. Extends the formula to solve combinations formed from several sets

J. Uses summation concept to find total number of combinations

K. Relates the concepts of permutations and combinations to real life situations

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

_____ PUPIL

_____ TEACHER

VI. Permutations and Combinations

____ A. Defines a permutation

____ B. Recognizes and uses the special notation associated with permutations

____ C. Defines n factorial and zero factorial

____ D. Has a working knowledge of the Fundamental Principle of permutations

____ E. Solves permutation problems

____ F. Defines a combination

____ G. Recognizes and uses special notation associated with combinations

____ H. Knows and uses the formula for working simple combinations

____ I. Extends the formula to solve combinations formed from several sets

____ J. Uses summation concept to find total number of combinations

____ K. Relates the concepts of permutations and combinations to real life situations

CURRICULUM GUIDE FOR MATHEMATICS

ADVANCED MATHEMATICS CONTINUUM

VII. Probability

A. Defines simple probability and works related problems

B. Uses proper symbols in expressing probabilities

C. Solves probability problems involving events which are

1. Independent

2. Dependent

3. Mutually exclusive

4. Nonmutually exclusive

D. Determines the odds that an event will occur

E. Points out the practical applications of probability to everyday situations

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

PUPIL _____ TEACHER _____

VII. Probability

____ A. Defines simple probability and works related problems

____ B. Recognizes and uses symbols to express probabilities

____ C. Solves probability problems

____ D. Determines odds that an event will occur

VIII. Differential Calculus

A. Demonstrates an understanding of the concept of limits

B. Has a working knowledge of symbols and abbreviations needed

C. Finds indicated limits of expressions

D. Examines functions for continuity at the point indicated

E. Knows and uses the General Rule in differentiating functions

F. Has a working knowledge of the formulas for differentiation

1. Derivative of a constant is zero

2. Derivative of a variable with respect to itself is unity

3. Derivative of the algebraic sum of n functions is equal to the algebraic sum of their derivatives

4. Derivative of the product of a constant and a function is equal to the product of the constant and the derivative of the function

5. Derivative of the product of two functions is equal to the first function times the derivative of the second, plus the second function times the derivative of the first

6. Derivative of the product of n functions is equal to the sum of the n products that can be formed by multiplying the derivative of each function by all the other functions

7. Derivative of a function with a constant exponent is equal to the product of the exponent, the function with the exponent diminished by unity, and the derivative of the function

8. Derivative of a fraction is equal to the denominator times the derivative of the numerator, minus the numerator times the derivative of the denominator, all divided by the square of the denominator

9. Derivative of the quotient of a function by a constant is equal to the derivative of the function divided by the constant

G. Recognizes various applications of the derivative

1. Finding slope
2. Determining equation of a tangent and its normal
3. Finding maximum and minimum values of a function
4. Finding velocity

H. Takes second derivative and finds acceleration

CHECKLIST

ADVANCED MATHEMATICS CONTINUUM

PUPIL _____ TEACHER _____

VIII. Differential Calculus

____ A. Demonstrates an understanding of the concept of limits

____ B. Has a working knowledge of symbols and abbreviations needed

____ C. Finds limits of expressions

____ D. Tests for continuity

____ E. Knows and uses the General Rule in differentiating functions

____ F. Has a working knowledge of the formulas for differentiation

____ G. Recognizes various applications of the derivative

____ H. Takes second derivative and finds acceleration

ENRICHMENT

I. Polynomial Functions

II. Boolean Algebra

III. Integral Calculus

INTRODUCTION TO

VOCATIONAL–PREPARATORY MATHEMATICS

This section of the continuum has been written for those high school students who need a socially useful mathematics which will give them a preparation for competent and happy citizenship. The primary aim is to equip the student with a working knowledge of those basic principles of mathematics that he will need for personal and business use in his adult life.

To meet the needs of many types of students, the continuum contains a number of different mathematical experiences. Since work is more interesting if a person has a practical purpose or goal in sight, many problems that relate to occupations and careers are included. In addition, the continuum provides a review of the basic fundamentals of mathematics.

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level A and Level B

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level A

I. Counting and Computing with Whole Numbers

A. Demonstrates a knowledge of early number systems such as

1. Roman

2. Egyptian

B. Defines

1. Integer

2. Digit

3. Significant figures

4. Denominate numbers

C. Uses place value as an aid in reading and writing numerals

D. Rounds off numbers to the designated degree of accuracy

E. Rounds off to one significant figure to estimate answers

F. Performs operations using whole numbers

1. Addition

2. Subtraction

3. Multiplication

4. Division

G. Works with denominate numbers

1. Addition

2. Subtraction

3. Multiplication

4. Division

H. Checks answers by reversing order, using inverse operations, or casting out nines

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

I. Counting and Computing with Whole Numbers

____ A. Demonstrates a knowledge of early number systems

____ B. Defines terms used

____ C. Reads and writes numerals

____ D. Rounds off numbers to given accuracy

____ E. Rounds off to one significant figure to estimate answers

____ F. Adds, subtracts, multiplies, and divides whole numbers

____ G. Adds, subtracts, multiplies, and divides denominate numbers

____ H. Checks answers by appropriate methods

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level A

II. Fractions

A. Defines

1. Numerator
2. Denominator
3. Unit fraction
4. Proper fraction
5. Improper fraction
6. Reciprocal
7. Lowest common denominator
8. Prime number
9. Mixed number

B. Recognizes that the common fraction a/b means a divided by b

C. Identifies proper fractions, improper fractions, and mixed numbers

D. Expresses fractions in higher or lower terms

E. Interchanges improper fractions and mixed numbers

F. Finds lowest common denominator and changes fractions to equivalent fractions

G. Compares two fractions to tell which is larger

H. Arranges a series of fractions in order of size

I. Adds fractions and mixed numbers

J. Subtracts fractions and mixed numbers

K. Multiplies fractions and mixed numbers

L. Divides fractions and mixed numbers using the inverse property

M. Simplifies all answers in any operation by reducing to lowest terms

N. Rounds off fractional numbers

O. Solves problems showing practical applications of fractions

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level A

_____ PUPIL _____ TEACHER

II. Fractions

____ A. Defines needed terms

____ B. Recognizes that a/b means a divided by b

____ C. Identifies proper fractions, improper fractions, and mixed numbers

____ D. Expresses fractions in higher or lower terms

____ E. Interchanges improper fractions and mixed numbers

____ F. Finds L.C.D. and changes fractions to equivalent fractions

____ G. Compares two fractions

____ H. Arranges a series of fractions in order of size

____ I. Adds fractions and mixed numbers

____ J. Subtracts fractions and mixed numbers

____ K. Multiplies fractions and mixed numbers

____ L. Divides fractions and mixed numbers

____ M. Simplifies all answers by reducing

____ N. Rounds off fractional numbers

____ O. Solves problems showing practical applications of fractions

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level A

III. Decimals

A. Defines decimal fraction and mixed decimal

B. Distinguishes between common fractions and decimal fractions

C. Reads and writes decimals

D. Interchanges decimals and common fractions

E. Rounds off decimals to a given place

F. Operates with decimals

1. Adds

2. Subtracts

3. Multiplies

*4. Divides

G. Compares decimals

H. Uses shortcut method to multiply or divide whole numbers and decimals by 10, 100, 1000, etc.

I. Finds averages

J. Estimates answers to problems containing decimals

K. Solves practical application problems involving decimals

* It is recommended that short division be taught and that long division of decimals be taught by the traditional method.

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

III. Decimals

____ A. Defines decimal fraction and mixed decimal

____ B. Distinguishes between common fractions and decimal fractions

____ C. Reads and writes decimals

____ D. Interchanges decimals and common fractions

____ E. Rounds off decimals to a given place

____ F. Adds, subtracts, multiplies, and divides decimals

____ G. Compares decimals

____ H. Uses shortcut method to multiply or divide whole numbers and decimals by 10, 100, 1000, etc.

____ I. Finds averages

____ J. Estimates answers to problems containing decimals

____ K. Solves practical application problems involving decimals

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level A

IV. Ratio and Per Cent

A. Defines ratio and recognizes the ways it may be expressed

B. Writes ratios

C. Forms equivalent ratios (proportion) having specified denominators

D. Uses ratio and proportion to solve verbal problems

E. Recognizes that per cent notation indicates that a number is being compared to 100

F. Notes that a comparison of two numbers may be expressed as either a ratio, a fraction, a decimal, or a per cent

G. Writes per cents (including per cents greater than 100% or less than 1%)

H. Interchanges per cents with decimals

I. Interchanges per cents with common fractions

J. Uses Chart I and Chart II found at the end of this unit as an aid and time-saver in computation (It is recommended that each student have a copy of these charts.)

K. Finds

1. A per cent of a number

2. What per cent one number is of another

3. A number when a per cent of it is known

L. Recognizes and uses the mnemonic device (is/of) as an aid in forming the ratio to solve per cent problems

M. Solves problems involving per cents greater than 100 or less than 1

N. Applies the knowledge of per cent to everyday use in finding

1. Batting averages
2. Commission
3. Discount
4. Sales tax
5. Profit and loss
6. Simple interest

CHART I

TABLE OF EQUIVALENTS

PER CENTS, DECIMALS, AND COMMON FRACTIONS

PER CENT	DECIMAL	COMMON FRACTION
5%	.05	1/20
6 1/4%	.06 1/4	1/16
8 1/3%	.08 1/3	1/12
10%	.10 or .1	1/10
12 1/2%	.12 1/2 or .125	1/8
16 2/3%	.16 2/3	1/6
20%	.20 or .2	1/5
25%	.25	1/4
30%	.30 or .3	3/10
33%	.33 1/3	1/3
37 1/2%	.37 1/2 or .375	3/8
40%	.40 or .4	2/5
50%	.50 or .5	1/2
60%	.60 or .6	3/5
62 1/2%	.62 1/2 or .625	5/8
66 2/3%	.66 2/3	2/3
70%	.70 or .7	7/10
75%	.75	3/4
80%	.80 or .8	4/5
83 1/3%	.83 1/3	5/6
87 1/2%	.87 1/2 or .875	7/8
90%	.90 or .9	9/10
100%	1.00 or 1	

SHORTCUTS IN MULTIPLICATION AND DIVISION

CHART II

1. To multiply a number by
   - (a) 50, multiply it by 100, then divide by 2
   - (b) 25, multiply it by 100, then divide by 4
   - (c) 20, multiply it by 100, then divide by 5
   - (d) 33 1/3, multiply it by 100, then divide by 3
   - (e) 12 1/2, multiply it by 100, then divide by 8
   - (f) 16 2/3, multiply it by 100, then divide by 6
   - (g) 8 1/3, multiply it by 100, then divide by 12
   - (h) 6 1/4, multiply it by 100, then divide by 16
2. To divide a number by
   - (a) 50, multiply it by 2, then divide by 100
   - (b) 25, multiply it by 4, then divide by 100
   - (c) 20, multiply it by 5, then divide by 100
   - (d) 33 1/3, multiply it by 3, then divide by 100
   - (e) 12 1/2, multiply it by 8, then divide by 100
   - (f) 16 2/3, multiply it by 6, then divide by 100
   - (g) 8 1/3, multiply it by 12, then divide by 100
   - (h) 6 1/4, multiply it by 16, then divide by 100

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

IV. Ratio and Per Cent

____ A. Defines ratio and recognizes the ways it may be expressed

____ B. Writes ratios

____ C. Forms equivalent ratios with specified denominators

____ D. Uses ratio and proportion in verbal problems

____ E. Notes that a comparison of two numbers may be expressed as either a ratio, a fraction, a decimal, or a per cent

____ F. Writes per cents

____ G. Interchanges per cents with decimals

____ H. Interchanges per cents with common fractions

I. Finds

____ 1. A per cent of a number

____ 2. What per cent one number is of another

____ 3. A number when a per cent of it is known

____ J. Forms ratios to solve per cent problems

____ K. Solves problems involving per cents greater than 100 or less than 1

____ L. Applies knowledge of per cent to everyday use in finding batting averages, commission, etc.

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level A

V. Measurement—English and Metric

A. Identifies and uses basic tools of measurement

B. Recognizes that all measurements are approximations

C. Demonstrates a working knowledge of everyday units of measurements

D. Converts within the English system, learning by rote the most common conversion factors and abbreviations

E. Rounds off measures

F. Defines the metric system and the basic units used

G. Demonstrates a working knowledge of the prefixes used

1. Milli-
2. Centi-
3. Deci-
4. Deca-
5. Hecto-
6. Kilo-

H. Uses standard abbreviations for metric units

I. Distinguishes between and works with units of length and weight in the metric system

J. Converts within the metric system such as

1. Centimeters to meters

2. Grams to kilograms

K. Interchanges metric and English equivalents

L. Demonstrates the use of the English and metric units in practical applications

M. Defines, reads, and uses a protractor to measure the follow[illegible]:

1. Angle

2. Acute angle

3. Right angle

4. Obtuse angle

5. Straight angle

6. Reflex angle

N. Uses ruler to make and interpret scale drawings

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

V. Measurement—English and Metric

____ A. Identifies and uses basic tools of measurement

____ B. Recognizes that all measurements are approximations

____ C. Demonstrates a working knowledge of everyday units of measurements

____ D. Converts within the English system

____ E. Rounds off measures

____ F. Defines the metric system and the basic units used

____ G. Demonstrates a working knowledge of the prefixes used

1. Milli-
2. Centi-
3. Deci-
4. Deca-
5. Hecto-
6. Kilo-

____ H. Uses standard abbreviations for metric units

____ I. Distinguishes between and works with units of length and weight in the metric system

____ J. Converts within the metric system

____ K. Interchanges metric and English equivalents

____ L. Demonstrates the use of the English and metric units in practical applications

____ M. Defines, reads, and measures various types of angles

____ N. Uses ruler to make and interpret scale drawings

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level B

VI. Graphs

A. Defines and recognizes bar graphs, broken-line graphs, circle graphs, and pictographs

B. Reads and interprets graphs, noting title, scales used, and the variations in design

C. Makes graphs using the following steps:

1. Choose type of graph

2. Organize data (rounding off if necessary)

3. Choose appropriate scales

4. Draw graph

5. Include title

D. Discusses everyday uses of graphs

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level B

PUPIL _____ TEACHER _____

VI. Graphs

____ A. Defines and recognizes bar graphs, broken-line graphs, circle graphs, and pictographs

____ B. Reads and interprets graphs

____ C. Makes graphs

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level B

VII. Formulas

A. Defines a formula

B. Translates word statements into formulas

C. Evaluates formulas

D. Defines perimeter and circumference

E. States formulas and finds perimeters of geometric figures such as

1. Triangle
2. Rectangle
3. Parallelogram
4. Trapezoid

F. States the formula and finds the circumference of a circle

G. Defines area and square unit

H. States formulas and finds areas of geometric figures such as

1. Rectangle
2. Square
3. Parallelogram
4. Triangle
5. Trapezoid
6. Circle

I. Defines volume and cubic unit

J. Uses the proper formula and finds the volume of

1. Rectangular solid
2. Cylinder
3. P amid
4. Cone
5. Sphere

K. Associates use of formulas with practical applications

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

VII. Formulas

____ A. Defines a formula

____ B. Translates word statements into formulas

____ C. Evaluates formulas

____ D. Defines perimeter and circumference

____ E. States formulas and finds perimeters of geometric figures

____ F. States the formula and finds circumference of a circle

____ G. Defines area and square unit

____ H. States formulas and finds areas of geometric figures

____ I. Defines volume and cubic unit

____ J. Uses the proper formula and finds volume of geometric figures

VIII. Computing Your Income

A. Defines

1. Overtime
2. Time and a half
3. Take-home pay
4. Double time
5. Hourly basis
6. Timecard
7. Salary
8. Rate of commission
9. Commission
10. Social security tax
11. Withholding tax
12. Taxable income
13. Exemption
14. Deductions

B. Computes income from hourly earnings

1. Determines overtime rate (if any)
2. Multiplies regular hourly rate by number of hours worked at regular rate of pay
3. Multiplies overtime hourly rate by number of hours of overtime worked
4. Adds the products found in steps (3) and (2)

C. Determines from a timecard the number of hours worked and then computes income

D. Computes income from piecework by multiplying the number of completed pieces of work by the amount paid per piece

E. Computes earnings paid on a commission basis

1. Expresses the rate of commission as a decimal fraction
2. Multiplies the number of dollars on which the commission is to be paid by the decimal fraction in step (1)

F. Computes total salary by adding commission earned to the basic salary

G. Computes social security tax to be deducted

1. Expresses <u>current</u> social security tax rate as a decimal

2. Multiplies the amount of money on which tax is to be paid by the decimal fraction of step (1)

H. Computes social security tax to be paid by employer, employee, and self-employed persons

I. Computes taxable income by subtracting the sum of the exemptions and deductions from the gross income

J. Computes Federal income tax from tables

K. Completes an <u>actual</u> income tax form, given a typical family situation

L. Interprets statement of earnings attached to check for take-home pay

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

VIII. Computing Your Income

____ A. Defines terms used

____ B. Computes income from hourly earnings, including overtime pay when applicable

____ C. Determines from a timecard the number of hours worked and then computes income

____ D. Computes income from piecework

____ E. Computes earnings paid on a commission basis

____ F. Computes total salary by adding commission and basic salary

____ G. Computes social security tax to be deducted

____ H. Computes social security tax to be paid by employer, employee, and self-employed persons

____ I. Computes taxable income

____ J. Computes Federal income tax from tables

____ K. Completes an actual income tax form

____ L. Interprets statement of earnings attached to check for take-home pay

IX. Managing Your Income

A. Defines

1. Budget
2. Checking account
3. Deposit
4. Endorsement
5. Payee
6. Drawer
7. Service charge
8. Cancelled checks
9. Bank statement
10. Federal Deposit Insurance

B. Plans a budget to include

1. Food
2. Clothing
3. Housing and household expenses
4. Health and recreation
5. Transportation
6. Savings
7. Miscellaneous expenses

C. Keeps an expense record for a given period of time, given a typical family income

D. Determines what per cent of the total income is spent on each item in a budget

E. Discusses factors to be considered in buying wisely

F. Works verbal problems applying rules for buying wisely

G. Writes checks and fills out check stubs correctly

H. Endorses checks properly

1. Blank endorsement
2. Full endorsement
3. Restricted endorsement

I. Prepares bank deposits

J. Examines bank statement noting various types of entries

K. Discusses the need for keeping cancelled checks as receipts

L. Reconciles the bank statement balance with the check stub balance

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

IX. Managing Your Income

____ A. Defines needed terms

____ B. Plans a budget

____ C. Keeps an expense record

____ D. Determines what per cent of the total income is spent on each item in a budget

____ E. Works verbal problems

____ F. Writes checks and fills out check stubs correctly

____ G. Endorses checks properly

____ H. Prepares bank deposits

____ I. Examines bank statement

____ J. Reconciles the bank statement balance with the check stub balance

CURRICULUM GUIDE FOR MATHEMATICS

GENERAL MATHEMATICS CONTINUUM

Level B

X. Using Your Income

A. Defines

1. Discount
2. Discount rate
3. Simple interest
4. Interest rate
5. Principal
6. Installment buying
7. Down payment
8. Carrying charge
9. Savings account
10. Compound interest

B. Finds discount and sale price, given the discount rate and the regular price

C. Finds discount rate

D. Knows and applies formula for simple interest

E. Demonstrates an understanding of the concept of installment buying, including down payment, carrying charge, and installments

F. Computes carrying charge and interest rate on installment purchases

G. Points out the advantage of cash buying rather than installment buying

H. Distinguishes between a checking account and a savings account

I. Computes compound interest

CHECKLIST

GENERAL MATHEMATICS CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

X. Using Your Income

____ A. Defines needed terms

____ B. Finds discount and sale price

____ C. Finds discount rate

____ D. Knows and applies simple interest formula

____ E. Demonstrates an understanding of the concept of installment buying

____ F. Computes carrying charge and interest rate on installment purchases

____ G. Distinguishes between a checking account and a savings account

____ H. Computes compound interest

ENRICHMENT

I. Other Number Bases (See page 126 in the guide)

II. Introduction to Algebra (page 188)

III. Geometric Constructions (page 183)

IV. Number Puzzles

V. Insurance, Stocks, and Bonds (pages 180 and 197)

CURRICULUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level A and Level B

CURRIUCLUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level A

I. Numbers and Their Operations

A. Demonstrates an understanding of the concept of place value

B. Reads and writes Roman numerals

C. Reads, writes, and rounds off numerals in the decimal (base 10) system

D. Reads and writes numerals in non-decimal systems (other number bases)

E. Recognizes and applies the properties of the number system to operations with numbers

F. Adds, subtracts, multiplies, and divides whole numbers

G. Reduces, adds, subtracts, multiplies, and divides common fractions

H. Adds, subtracts, multiplies, and divides decimal fractions

I. Compares two whole numbers, two fractions, or two decimals to determine which is larger

J. Arranges a series of numbers in order of size

K. Defines

1. Factor
2. Prime number
3. Composite number
4. Greatest common factor (G.C.F.)
5. Least common multiple (L.C.M.)

L. Factors whole numbers into primes

M. Determines G.C.F. and L.C.M., given a set of numbers

N. Defines and works with per cent

O. Relates common fraction—decimal fraction—per cent equivalents (See page 149 in guide.)

P. Defines irrational numbers as non-terminating and non-repeating decimals

Q. Extracts square roots by

1. Use of tables

2. Approximation

3. Traditional method

R. Checks answers using appropriate methods such as reversing order, using inverse operations, and casting out nines

S. Solves practical application problems

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

I. Numbers and Their Operations

____ A. Demonstrates an understanding of the concept of place value

____ B. Reads and writes Roman numerals

____ C. Reads, writes, and rounds off numerals in decimal system

____ D. Reads and writes numerals in other number bases

____ E. Recognizes and applies properties of the number system

____ F. Operates with whole numbers

____ G. Operates with common fractions

____ H. Operates with decimal fractions

____ I. Compares two numbers to determine which is larger

____ J. Arranges a series of numbers in order of size

____ K. Defines terms associated with factoring

____ L. Factors whole numbers into primes

____ M. Determines G.C.F. and L.C.M., given a set of numbers

____ N. Defines and works with per cent

____ O. Relates common fraction-decimal-per cent equivalents

____ P. Defines irrational numbers

____ Q. Extracts square roots

____ R. Checks answers using appropriate methods

II. Measurement

A. Defines

1. Precision
2. Maximum error
3. Tolerance
4. Significant digits
5. Denominate numbers

B. Recognizes that numbers used for counting are exact and that all measurements are approximate

C. Determines unit of measure used and states precision of a measurement

D. Determines unit of measure and states the maximum error

E. Tells the number of significant digits

F. Applies the concepts of precision and accuracy to practical situations

G. Expresses measurements in like units before performing fundamental operations

H. Performs operations with denominate numbers, converting all answers to simplest form

I. Defines the metric system and the basic units used

J. Demonstrates a working knowledge of the prefixes used

1. Milli-
2. Centi-
3. Deci-
4. Deca-
5. Hecto-
6. Kilo-

K. Uses standard abbreviations for metric units

L. Distinguishes among and works with units of length, weight, and volume in the metric system

M. Converts within the metric system such as

1. Centimeters to meters
2. Grams to kilograms
3. Milliliters to liters

N. Interchanges metric and English equivalents

O. Demonstrates the use of the English and metric units in practical applications, such as

1. Olympic results
2. Scale drawings
3. Construction and design

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

II. Measurement

____ A. Defines needed terms

____ B. Recognizes that numbers used for counting are exact and that all measurements are approximate

____ C. Determines unit of measure used and states precision of a measurement

____ D. Determines unit of measure and states the maximum error

____ E. Tells the number of significant digits

____ F. Performs operations with denominate numbers

____ G. Defines the metric system and the basic units used

____ H. Demonstrates a working knowledge of the prefixes used in the metric system

____ I. Uses standard abbreviations for metric units

____ J. Distinguishes among and works with units of length, weight, and volume in the metric system

____ K. Converts within the metric system

____ L. Interchanges metric and English equivalents

CURRICULUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level A

III. Graphs and Statistics

A. Defines and recognizes bar graphs, broken-line graphs, circle graphs, and pictographs

B. Reads and interprets graphs, noting title, scales used, and the variations in design

C. Makes graphs

D. Uses graphs to show relationships in statistical data

E. Defines

1. Statistics
2. Central tendency
3. Mean (arithmetic average)
4. Frequency
5. Frequency table
6. Median
7. Mode

F. Estimates and computes the mean (arithmetic average)

G. Prepares frequency table from given data and finds mean, median, and mode

1. By listing data singly
2. By grouping data in intervals

H. Applies statistical measures to data obtained from real life situations

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level A

_____ PUPIL

_____ TEACHER

III. Graphs and Statistics

____ A. Defines and recognizes bar graphs, broken-line graphs, circle graphs, and pictographs

____ B. Reads and interprets graphs

____ C. Makes graphs

____ D. Defines terms related to statistics

____ E. Estimates and computes the mean

____ F. Prepares frequency table and finds mean, median, and mode

CURRICULUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level A

IV. Consumer Income

A. Defines

1. Income
2. Withholding tax
3. Social security tax
4. Take-home pay
5. Income tax
6. Overtime
7. Time and a half
8. Double time
9. Hourly wage
10. Timecard
11. Commission
12. Taxable income
13. Exemption
14. Deductions

B. Determines from a time card the number of hours worked

C. Figures income on hourly basis, using overtime when applicable

D. Computes income from piecework

E. Computes earnings on a commission basis

F. Finds the amount to be deducted for social security tax, using <u>current</u> tax rate

G. Completes an employee's withholding exemption certificate

H. Finds amount of withholding tax

I. Calculates take-home pay for a given pay period

J. Completes an actual income tax return, given a typical family situation

1. Interprets a W-2 form
2. Figures deductions and exemptions
3. Computes taxable income

4. Finds tax from tables

5. Compares results of steps (1) and (4) to determine either refund or tax due

K. Knows and uses the formula for simple interest

L. Computes simple interest using the 6%—60 day method as a shortcut

M. Distinguishes between simple and compound interest

N. Notes that a savings account produces income

O. Finds interest earned on savings accounts

P. Solves problems involving compound interest using computation, formula, or tables

Q. Defines stocks and bonds

R. Solves problems involving stocks and bonds

S. Figures monthly social security benefit payments using <u>current</u> benefit schedule

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

IV. Consumer Income

____ A. Defines needed terms

____ B. Figures income on hourly basis

____ C. Computes income from piecework

____ D. Computes earnings on a commission basis

____ E. Finds amount of social security tax to be deducted

____ F. Completes an employee's withholding certificate

____ G. Finds amount of withholding tax

____ H. Calculates take-home pay

____ I. Completes an actual income tax return

____ J. Knows and uses the formula for simple interest

____ K. Computes simple interest using 6%—60 day method

____ L. Finds interest earned on savings accounts

____ M. Solves problems involving compound interest

____ N. Solves problems involving stocks and bonds

____ O. Figures monthly social security benefit payments

CURRICULUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level B

V. Consumer Expenditures

A. Defines

1. Checking account
2. Budget
3. Installment buying
4. Carrying charge
5. Invoice
6. Discount
7. Discount rate
8. Promissory notes
9. Bank discounts
10. Beneficiary
11. Policy
12. Premium

B. Completes forms necessary for opening checking accounts

C. Writes checks and fills out check stubs correctly

D. Endorses checks properly

E. Examines bank statement and reconciles the bank statement balance with the check stub balance

F. Discusses the need for keeping canceled checks as receipts

G. Plans a budget to include

1. Food
2. Clothing
3. Housing and household expenses
4. Health and recreation
5. Transportation
6. Savings
7. Insurance
8. Miscellaneous expenses

H. Keeps an expense record for a given period of time, given a typical family income

I. Determines what per cent of the total income is spent on each item in a budget

J. Discusses wise buying and applies it to verbal problems

K. Compares and contrasts the advantages and disadvantages of installment buying

L. Computes carrying charge and interest rate on installment purchases

M. Finds true rate of interest on installment buying by using

1. Table of payments
2. Average principal

N. Solves problems related to life insurance using tables for

1. Mortality
2. Term
3. Straight life
4. Limited payment
5. Endowment

O. Demonstrates a working knowledge of

1. Discount
2. Discount rate
3. List price
4. Sale (net) price
5. Successive discounts
6. Single equivalent discount

P. Knows and applies concepts relating to promissory notes and bank discounts

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level B

PUPIL _____ TEACHER _____

V. Consumer Expenditures

____ A. Defines terms used in this unit

____ B. Completes forms needed to open a checking account

____ C. Writes checks, fills out stubs, and endorses checks

____ D. Reconciles bank statement balance with the check stub balance

____ E. Plans a budget

____ F. Keeps an expense record for a given period of time

____ G. Determines what per cent of total income is spent on each item in a budget

____ H. Computes carrying charge and interest rate on installment purchases

____ I. Finds true rate of interest on installment purchases

____ J. Solves problems related to life insurance

____ K. Demonstrates a working knowledge of terms related to sales discounts and bank discounts

____ L. Works problems involving promissory notes and bank discounts

CURRICULUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level B

VI. Basic Ideas of Geometry

A. Defines

1. Angle
2. Protractor
3. Perpendicular lines
4. Parallel lines
5. Transversal
6. Congruence
7. Ratio
8. Similar triangles
9. Polygon

B. Notes undefined geometric terms

1. Point
2. Line

C. Identifies the parts of an angle and reads an angle

D. Classifies angles by measure or relationship

1. Acute
2. Right
3. Obtuse
4. Straight
5. Alternate-interior
6. Corresponding
7. Vertical (opposite)

E. Uses protractor to measure and to draw angles

F. Distinguishes between and works with complementary and supplementary angles

G. Uses compass and unmarked straight edge to construct

1. An angle equal to a given angle
2. A line parallel to a given line

3. A segment equal to a given segment

4. A given number of equal segments on a line

H. Classifies triangles according to angles and sides

I. Identifies and names corresponding parts of similar and congruent polygons

J. Knows and applies three methods of proving triangles congruent

1. SAS

2. SSS

3. ASA

K. Writes ratios from given information

L. Writes equal ratios (proportions) identifying means and extremes

M. Solves problems involving ratio

N. Knows and applies the concept of similarity to triangles

O. Distinguishes between inductive and deductive reasoning

P. Writes simple proofs (optional)

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level B

_____ PUPIL

_____ TEACHER

VI. Basic Ideas of Geometry

____ A. Defines needed terms

____ B. Notes undefined geometric terms

____ C. Identifies the parts of an angle and reads an angle

____ D. Classifies angles by measure or relationship

____ E. Uses protractor to measure and to draw angles

____ F. Distinguishes between and works with complementary and supplementary angles

____ G. Uses compass and unmarked straight edge to construct geometric figures

____ H. Classifies triangles according to angles and sides

____ I. Identifies and names corresponding parts of similar and congruent polygons

____ J. Knows and applies three methods of proving triangles congruent

____ K. Writes ratios from given information

____ L. Writes proportions identifying means and extremes

____ M. Solves problems involving ratio

____ N. Knows and applies the concept of similarity to triangles

____ O. Distinguishes between inductive and deductive reasoning

CURRICULUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level B

VII. Formulas, Areas, and Volumes

A. Defines a formula

B. Translates word statements into formulas

C. Evaluates formulas

D. Solves simple verbal problems using formulas

E. Defines polygon, perimeter, and circumference

F. Writes formulas and finds perimeters of triangles, squares, and other polygons

G. Writes formula and finds circumference of circle

H. Defines

1. Area
2. Square unit (surface unit)
3. Exponent
4. Altitude (height)

I. Writes formulas and finds areas of

1. Rectangle
2. Square
3. Parallelogram
4. Triangle
5. Trapezoid
6. Circle

J. Applies basic area formulas to more complex polygons

K. Defines volume and cubic unit

L. Uses the proper formula and finds the volume of

1. Rectangular solid
2. Cube
3. Cone
4. Cylinder
5. Pyramid
6. Sphere

M. Associates use of formulas with practical applications

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level B

PUPIL _____ TEACHER _____

VII. Formulas, Areas, and Volumes

____ A. Defines formula

____ B. Translates word statements into formulas

____ C. Evaluates formulas

____ D. Solves verbal problems using formulas

____ E. Defines polygon, perimeter, and circumference

____ F. Writes formulas and finds perimeters of different polygons

____ G. Writes formula and finds circumference of circle

____ H. Defines terms related to area

____ I. Writes formulas and finds areas

____ J. Defines volume and cubic unit

____ K. Uses formulas and finds volumes

CURRICULUM GUIDE FOR MATHEMATICS

SENIOR MATHEMATICS CONTINUUM

Level B

VIII. Basic Ideas of Algebra

A. Defines

1. Variable
2. Expression
3. Equation
4. Inequality
5. Like terms
6. Absolute value
7. Monomial
8. Polynomial

B. Translates word expressions into algebraic expressions using appropriate symbols

C. Interprets algebraic expressions

D. Uses the rule for order of operations to evaluate numerical expressions

E. Evaluates algebraic expressions

F. Demonstrates an understanding of the properties of the real number system

G. Solves simple equations and inequalities and checks the solution (root)

H. Translates simple word statements into algebraic statements and solves

I. Simplifies expressions by combining like terms

J. Solves equations requiring more than one operation

K. Defines real number line, positive numbers, and negative numbers

L. Uses the real number line as an aid in adding or subtracting directed numbers

M. Uses the concept of absolute value to derive rules for adding and subtracting directed numbers

N. Adds and subtracts directed numbers by using rules

O. Knows and applies rules for multiplication and division of directed numbers (noting that zero can not be used as a divisor)

P. Simplifies expressions and solves equations containing symbols of inclusion

Q. Defines

1. Graph
2. Horizontal axis
3. Vertical axis
4. Coordinates (ordered pairs)
5. Rectangular coordinate system
6. Ordinate
7. Abscissa
8. Origin
9. Quadrant
10. Linear equation

R. Graphs formulas in first quadrant

S. Plots points and graphs linear equations in the coordinate plane

T. Defines right triangle, hypotenuse, and legs

U. Knows and applies the Pythagorean Theorem

V. Defines an irrational number, a perfect square, and principal square root

W. Extracts square root by using

1. Table
2. Approximation
3. Traditional method

CHECKLIST

SENIOR MATHEMATICS CONTINUUM

Level B

PUPIL _____ TEACHER _____

VIII. Basic Ideas of Algebra

____ A. Defines needed terms

____ B. Translates word expressions into algebraic expression.

____ C. Interprets algebraic expressions

____ D. Evaluates numerical expressions

____ E. Evaluates algebraic expressions

____ F. Demonstrates an understanding of the properties of the real number system

____ G. Solves and checks simple equations and inequalities

____ H. Translates simple word statements into algebraic statements and solves

____ I. Simplifies expressions by combining like terms

____ J. Solves equations requiring more than one operation

____ K. Defines real number line, positive numbers, and negative numbers

____ L. Adds and subtracts directed numbers using the real number line

____ M. Uses the concept of absolute value

____ N. Adds and subtracts directed numbers using rules

____ O. Knows and applies rules for multiplication and division of directed numbers

____ P. Simplifies expressions and solves equations containing symbols of inclusion

____ Q. Defines terms needed in graphing

____ R. Graphs formulas in first quadrant

____ S. Plots points and graphs linear equations in the coordinate plane

____ T. Defines right triangle, hypotenuse, and legs

____ U. Knows and applies the Pythagorean Theorem

____ V. Defines an irrational number, a perfect square, and principal square root

____ W. Extracts square roots

ENRICHMENT

I. Logarithms (see page 53 in the guide)

II. Logic (page 119)

III. Probability, Permutations, and Combinations (pages 130,132)

CURRICULUM GUIDE FOR MATHEMATICS

BUSINESS MATHEMATICS CONTINUUM

Level A and Level B

CURRICULUM GUIDE FOR MATHEMATICS

BUSINESS MATHEMATICS CONTINUUM

Level A

I. Fundamentals of Business Arithmetic

A. Demonstrates a detailed knowledge of all terms and definitions pertaining to fundamental operations

B. Reads, writes, and compares

1. Whole numbers

2. Decimals

3. Fractions

C. Adds, subtracts, multiplies, and divides

1. Whole numbers

2. Decimals

3. Fractions

4. Denominate numbers

D. Solves verbal business problems applying fundamental operations

E. Extends the understanding of fractions to include ratio and proportion

F. Interchanges common fraction—decimal—per cent equivalents (refer to chart on p. 149 in the guide)

G. Solves percentage problems using the formula $p = br$

H. Solves problems involving per cents less than 1 and greater than 100

I. Works business problems involving per cents

J. Reads, interprets, and draws

1. Bar graphs

2. Broken-line graphs

3. Circle graphs

CHECKLIST

BUSINESS MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

I. Fundamentals of Business Arithmetic

____ A. Demonstrates a detailed knowledge of all terms and definitions pertaining to fundamental operations

B. Reads, writes, and compares

____ 1. Whole numbers

____ 2. Fractions

____ 3. Decimals

C. Adds, subtracts, multiplies, and divides

____ 1. Whole numbers

____ 2. Fractions

____ 3. Decimals

____ 4. Denominate numbers

____ D. Solves verbal business problems using the fundamental operations

____ E. Works with ratio and proportion

____ F. Interchanges common fraction-decimal-per cent equivalents

____ G. Solves percentage problems using the formula $p = br$

____ H. Solves problems involving per cents less than 1 and greater than 100

____ I. Works business problems involving per cents

J. Reads, interprets, and draws

____ 1. Bar graphs

____ 2. Broken-line graphs

____ 3. Circle graphs

CURRICULUM GUIDE FOR MATHEMATICS

BUSINESS MATHEMATICS CONTINUUM

Level A

II. Family Income and Community Activities

A. Defines terms associated with budgets, utilities, taxes, insurance, and personal banking

B. Plans a budget and keeps an expense record, given a typical family situation

C. Applies the principles of wise buying to the solution of verbal problems

D. Demonstrates a working knowledge of personal banking

1. Fills out deposit slips

2. Writes checks and fills in check stubs

3. Interprets bank statements and service charges

4. Reconciles bank statements

E. Reads meters and computes the cost of utilities

F. Discusses the need for and distinguishes between various types of automobile insurance

1. Public liability

2. Property damage

3. Comprehensive

4. Collision

G. Lists and works with factors related to fire insurance

1. Type of construction

2. Geographic location

3. Type of policy (regular, homeowner's)

H. Outlines in order of premium cost from lowest to highest, types of life insurance

1. Term
2. Ordinary life
3. Limited payment
4. Endowment

I. Demonstrates an understanding of factors related to life insurance

1. Mortality tables
2. Computation of premiums and methods of payment
3. Financial protection (or savings)
4. Privileges (cash value, borrowing)

J. Answers questions about insurance benefits paid by social security

1. Income and age limitations
2. Retirement
3. Survivor's
4. Disability

K. Solves verbal problems involving insurance

L. Demonstrates a working knowledge of direct and indirect taxes

1. Sales
2. Internal revenue (excise, estate, income)
3. Property

CHECKLIST

BUSINESS MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

II. Family Income and Community Activities

___ A. Defines terms associated with budgets, utilities, taxes, insurance, and personal banking

___ B. Plans a budget and keeps an expense record

___ C. Solves verbal problems related to use of family income

D. Demonstrates a working knowledge of personal banking

___ 1. Fills out deposit slips

___ 2. Writes checks and fills out check stubs

___ 3. Interprets bank statements and service charges

___ 4. Reconciles bank statements

___ E. Reads meters and computes the cost of utilities

___ F. Distinguishes between types of automobile insurance

___ G. Lists and works with factors related to fire insurance

___ H. Distinguishes between types of life insurance

___ I. Computes life insurance premiums

___ J. Answers questions about social security benefits

___ K. Solves verbal problems involving insurance

L. Demonstrates a working knowledge of direct and indirect taxes

___ 1. Sales

___ 2. Internal Revenue (excise, estate, income)

___ 3. Property

CURRICULUM GUIDE FOR MATHEMATICS

BUSINESS MATHEMATICS CONTINUUM

Level A

III. Preparation of Payrolls

A. Computes income based on

1. Hourly (or daily) rate
2. Salaried earnings
3. Piecework wage system
4. Overtime pay rate
5. Rate of commission

B. Fills out

1. Application for social security number
2. Withholding exemption forms

C. Names common payroll deductions such as

1. Federal income tax (withholding)
2. Social security tax (F.I.C.A.)
3. State income tax
4. Retirement
5. Union dues
6. Insurance premiums
7. Payroll savings

D. Computes individual total wages, deductions, and net (take-home) pay

E. Completes a company payroll for a given pay period

F. Prepares a currency memorandum to meet a payroll

C. Completes actual end-of-the year forms for federal and state income tax, given a typical family situation

CHECKLIST

BUSINESS MATHEMATICS CONTINUUM

Level A

PUPIL _____ TEACHER _____

III. Preparation of Payroll

A. Computes income based on

___ 1. Hourly (or daily) rate

___ 2. Salaried earnings

___ 3. Piecework wage system

___ 4. Overtime pay rate

___ 5. Rate of commission

B. Fills out

___ 1. Application for social security number

___ 2. Withholding exemption forms

C. Names common payroll deductions such as

___ 1. Federal income tax

___ 2. Social security tax

___ 3. State income tax

___ 4. Retirement

___ 5. Union dues

___ 6. Insurance premiums

___ 7. Payroll savings

___ D. Computes individual total wages, deductions, and take-home pay

___ E. Completes a company payroll

___ F. Prepares a currency memorandum

___ G. Completes federal and state income tax forms

IV. Problems in Retail Selling

A. Defines

1. Discounts (trade and cash)
2. Discount rate
3. List price
4. Net price
5. Successive discounts
6. Equivalent discount
7. Invoice

B. Finds discount and net price, given the list price and rate of discount

C. Finds net price, given a series of discounts and the list price

D. Finds a single discount rate equivalent to a series of discount rates

E. Finds discount rate or list price when other information is given

F. Solves verbal problems related to discounts

G. Reads and interprets invoices computing discount and net amount to be paid

H. Defines

1. Margin (markup)
2. Selling price
3. Overhead
4. Profit
5. Loss
6. Gross profit

I. Computes margin and per cent of margin based on

1. Cost
2. Selling price

J. Computes the selling price when per cent of margin is based on

   1. Cost

   2. Selling price

K. Computes cost when per cent of margin is based on selling price

L. Works problems based on the selling price formula S = C + O + P

M. Codes cost on a simulated price tag (optional)

N. Applies concepts of retail selling to the solution of verbal problems

CHECKLIST

BUSINESS MATHEMATICS CONTINUUM

Level B

PUPIL _____ TEACHER _____

IV. Problems in Retail Selling

____ A. Defines terms related to discount

____ B. Finds discount and net price, given the list price and rate of discount

____ C. Finds net price, given a series of discounts and the list price

____ D. Finds a single discount rate equivalent to a series of discount rates

____ E. Finds discount rate or list price when other information is given

____ F. Solves verbal problems related to discounts

____ G. Reads and interprets invoices, computing discount and net amount to be paid

____ H. Defines terms related to profit and loss

I. Computes margin and per cent of margin based on

____ 1. Cost

____ 2. Selling price

J. Computes the selling price when per cent of margin is based on

____ 1. Cost

____ 2. Selling price

____ K. Computes cost when per cent of margin is based on selling price

____ L. Works problems based on the formula $S = C + O + P$

____ M. Solves verbal problems

V. Interest, Bank Discount, and Installment Buying

A. Uses the formula i = prt to solve simple interest problems (noting 6%—60 day method)

B. Finds time lapse between two dates and computes exact interest

C. Defines promissory note and related terms

D. Works with promissory notes to find

1. Interest (bank discount)

2. Net proceeds

3. Amount due at maturity

E. Distinguishes between simple interest and compound interest

F. Computes amount and/or compound interest at end of a given period by

1. Traditional method

2. Use of tables

G. Distinguishes between a checking account and a savings account

H. Computes interest and total amount of a savings account for a given period of time

I. Defines installment buying, carrying charge, and down payment

J. Lists advantages and disadvantages of installment buying

K. Determines carrying charge, given cash price and installment price

L. Computes installment price by adding the down payment to the product of the number of payments and the amount of each payment

M. Computes true rate of interest on installment purchases

CHECKLIST

BUSINESS MATHEMATICS CONTINUUM

Level B

_____ PUPIL _____ TEACHER

V. Interest, Bank Discount, and Installment Buying

____ A. Uses the formula i = prt to solve problems

____ B. Uses 6%—60 day method

____ C. Defines promissory note and related terms

D. Works with promissory notes to find

____ 1. Interest

____ 2. Net proceeds

____ 3. Amount due at maturity

____ E. Computes amount and compound interest at end of a period

____ F. Computes interest and total amount of a savings account

____ G. Defines installment buying, carrying charge, and down payment

____ H. Lists advantages and disadvantages of installment buying

____ I. Determines carrying charge

____ J. Computes installment price

____ K. Computes true rate of interest on installment purchases

CURRICULUM GUIDE FOR MATHEMATICS

BUSINESS MATHEMATICS CONTINUUM

Level B

VI. Business Problems in Local Industries

A. Defines

1. Savings and loan association
2. Mortgage
3. Depreciation
4. Dividend
5. Series E bonds
6. Board feet
7. Co-operative
8. Maturity (of a bond)

B. Lists functions of banks and savings and loan associations

C. Solves verbal problems involving loans for personal or business use

D. Demonstrates an understanding of U. S. Savings Bonds

1. As a means of savings
2. Bought through Payroll Savings Plan
3. Determines maturity value and maturity date from table

E. Defines credit union and discusses the functions of credit unions

F. Calculates depreciation by

1. Straight-line method
2. Declining-balance method
3. Sum-of-the-years'-digits method (optional)

G. Lists local industries and investigates business-related problems

H. Finds the number of board feet in a quantity of lumber using the formula
No. of Bd. ft. = length in ft. x width in ft. x thickness in inches

I. Solves verbal problems relating to

1. Farming
2. Stock-raising
3. Co-operative marketing
4. Poultry and dairy industries
5. Truck gardening and fruit industries
6. Fishing
7. Transportation costs
8. Wood products
9. Construction industry

CHECKLIST

BUSINESS MATHEMATICS CONTINUUM

Level B

PUPIL _____ TEACHER _____

VI. Business Problems in Local Industries

____ A. Defines needed terms

____ B. Lists functions of banks and savings and loan associations

____ C. Solves verbal problems involving loans for personal or business use

____ D. Demonstrates an understanding of U. S. Savings Bonds

____ E. Defines credit union and discusses their functions

____ F. Calculates depreciation

____ G. Finds the number of board feet in a quantity of lumber

____ H. Solves verbal problems concerning local industries

ENRICHMENT

I. Civil Service and Employment

II. Annuities, Stocks, and Bonds

III. Measurements and Bar Graphs (see pages 172 and 175 in guide)

IV. Business Records

A. Balance Sheet

B. Income Statement

C. Profit and Loss Statement

D. Inventory